The Fifteenth Biennial Conference of the International Institute of Fisheries Economics & Trade (IIFET)

Book of Abstracts

Livre de Résumés

Economics of fish resources and aquatic ecosystems: balancing uses, balancing costs

L'économie des ressources halieutiques et des écosystèmes aquatiques: équilibrer les usages, équilibrer les coûts

Le Corum
Montpellier, France
July 13-16, 2010
Website: http://www.colloque.ird.fr/iifet-2010

CONTENTS

GENERAL INFORMATION

Welcoming Remarks from IIFET

The International Institute of Fisheries Economics & Trade (IIFET) was founded in 1982 with the goal of providing a mechanism for interaction, and a forum for exchange, among those from all professional orientations and all nations, on the economics of fisheries, their management, aquaculture and seafood trade. Through our conferences and networks, we overcome barriers to the full exchange of information between academics, policy makers, industry members, and other interest groups, in all nations which catch, produce, and consume marine products around the world.

We have held a series of successful international conferences in a wide variety of venues (Alaska USA, Quebec, Christchurch New Zealand, Denmark, Chile, Paris France, Taiwan, Morocco, Norway, Oregon USA, Wellington New Zealand, Japan, the UK, and Vietnam). We were delighted to receive the proposal of a group of French institutions offering to collaboratively host our 2010 conference in Montpellier. This would give us our first Mediterranean location and also build a strong team of expertise from institutions all over France, including the Institut de Recherche pour le Developpement (IRD), the University of Brest, the University of Nantes, the University of Montpellier, IFREMER, and other sponsors.

We have been very pleased with the response of this excellent team to all of the challenges posed in organizing IIFET 2010 Montpellier. The conference title, ***Economics of fish resources and aquatic ecosystems: balancing uses, balancing costs,*** indicates the variety of topics covered by the 480 presentations from which participants will benefit. Conference topics will include seafood markets, fishery management, aquaculture economics and development, modeling, and fishing behavior, with sessions on the impacts of climate change, co-management, recreational fishing, the effects of foreign assistance, food security, productivity, and global tuna management, among many other topics of vital interest.

It is our hope that strong synergies will be developed among the conference participants from around the world. Each will come with his or her piece of the puzzle, and each will take home to his or her country a plethora of new ideas and new approaches to the many complex problems facing resource managers, seafood industries, and consumers today. In addition, each will have developed new and useful relationships with individuals from other countries and professions who are facing the same issues, with the potential to provide a fruitful basis for future collaborations.

Organizers and Committees

Organizers

IIFET 2010 Montpellier is organised by:

- IRD - Institut de Recherche pour le Développement, France
- IFREMER - Institut Français de Recherche pour l'Exploitation de la MER, France
- UMR Amure Université de Brest/Ifremer, Brest, France
- Université de Montpellier I, Montpellier, France
- Université de Nantes, Nantes, France

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Website : http://www.colloque.ird.fr/iifet-2010

IIFET Secretariat
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Web: http://oregonstate.edu/Dept/IIFET/

Organizing Committee

Co-chair	Christian Chaboud	UMR EME (Ird/Ifremer/UM2), France
Co-chair	Nathalie Finot	IRD France
Co-chair	Francis Laloë	IRD France
	Nina Dumas-Rozoy	IRD France
	Patrice Guillotreau	Nantes University
	Séverine Julien	UMR AMURE, Brest University, France
	Philippe Méral	IRD France
	Hélène Rey-Valette	Montpellier University, France
	Ann Shriver	IIFET
	Olivier Thébaud	IFREMER (France) and CSIRO, Australia

Scientific Committee

Co-chair	Jean Boncoeur	AMURE, Brest University, France
Co-chair	Steve Cunningham	IDDRA, UK
	Max Aguero	ICSED, Chile
	Claire Armstrong	Tromso University, Norway
	Robert Arthur	MRAG Ltd, London, UK
	Christian Chaboud	UMR EME (Ird/Ifremer/UM2), France
	Tony Charles	St Mary's Univ., Halifax, Canada
	Anthony Cox	OECD
	Susan Hanna	Oregon State University, USA
	Dan Holland	Gulf of Maine Research Institute, USA
	Sharon Hutchinson	University of the West Indies, Trinidad and Tobago
	John Kurien	FAO, Indonesia
	Sherry Larkin	University of Florida, USA
	Rebecca Lent	NOAA, USA
	Pingsun Leung	University of Hawaii, USA
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	Sean Pascoe	CSIRO, Australia
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	Jenny Sun	National Taiwan Ocean University, Taiwan
	Olivier Thébaud	CSIRO, Australia
	Diana Tingley	UK
	Kuperan Viswanathan	Malaysia
	Jimmy Young	University of Stirling, Scotland, UK

General information for participants

Location

CORUM
Esplanade Charles de Gaulle
(Entrance level 1: Pedestrian Street, rue des républicains Espagnols)
BP 2200
34000 Montpellier
Telephone: (00 33) 4 67 61 67 61
E-mail: corum@enjoy-montpellier.com

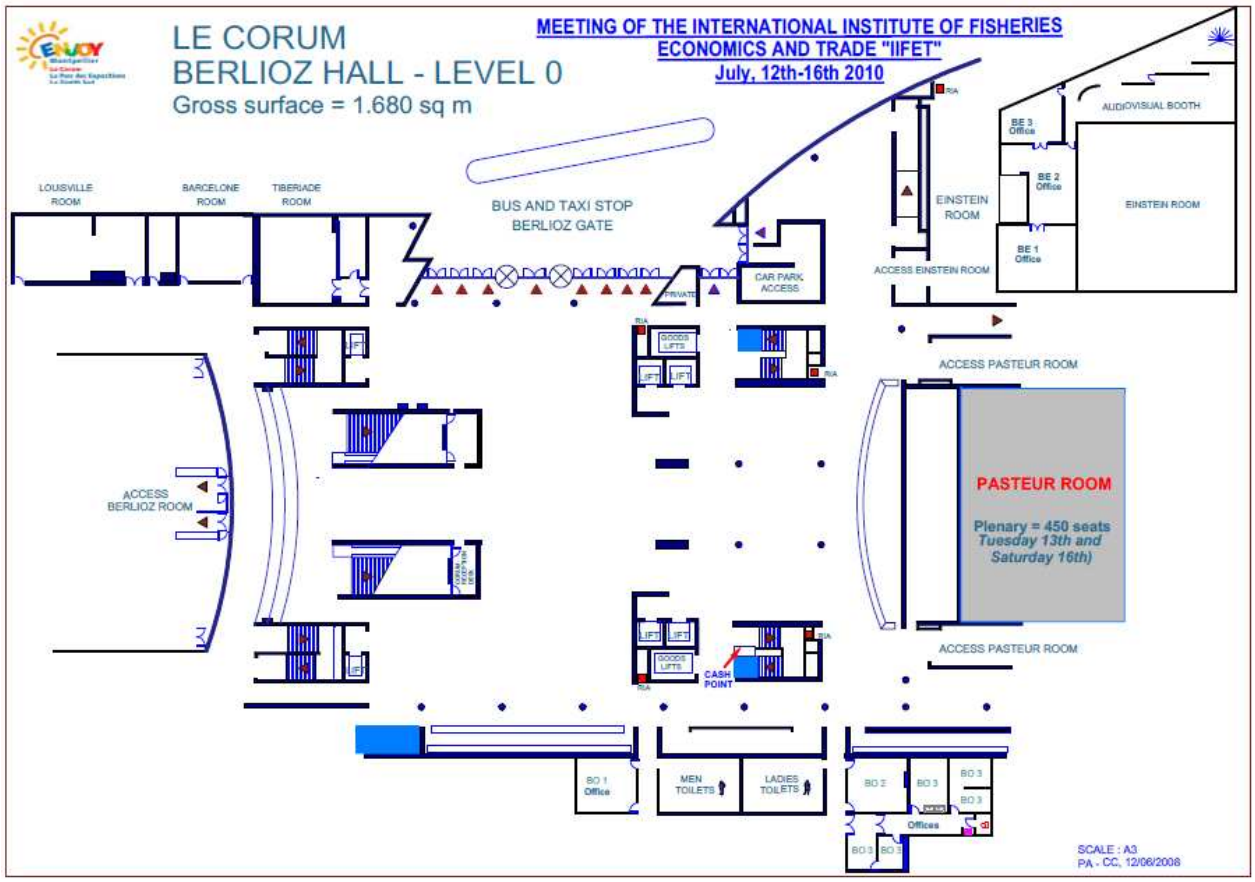
Internet access

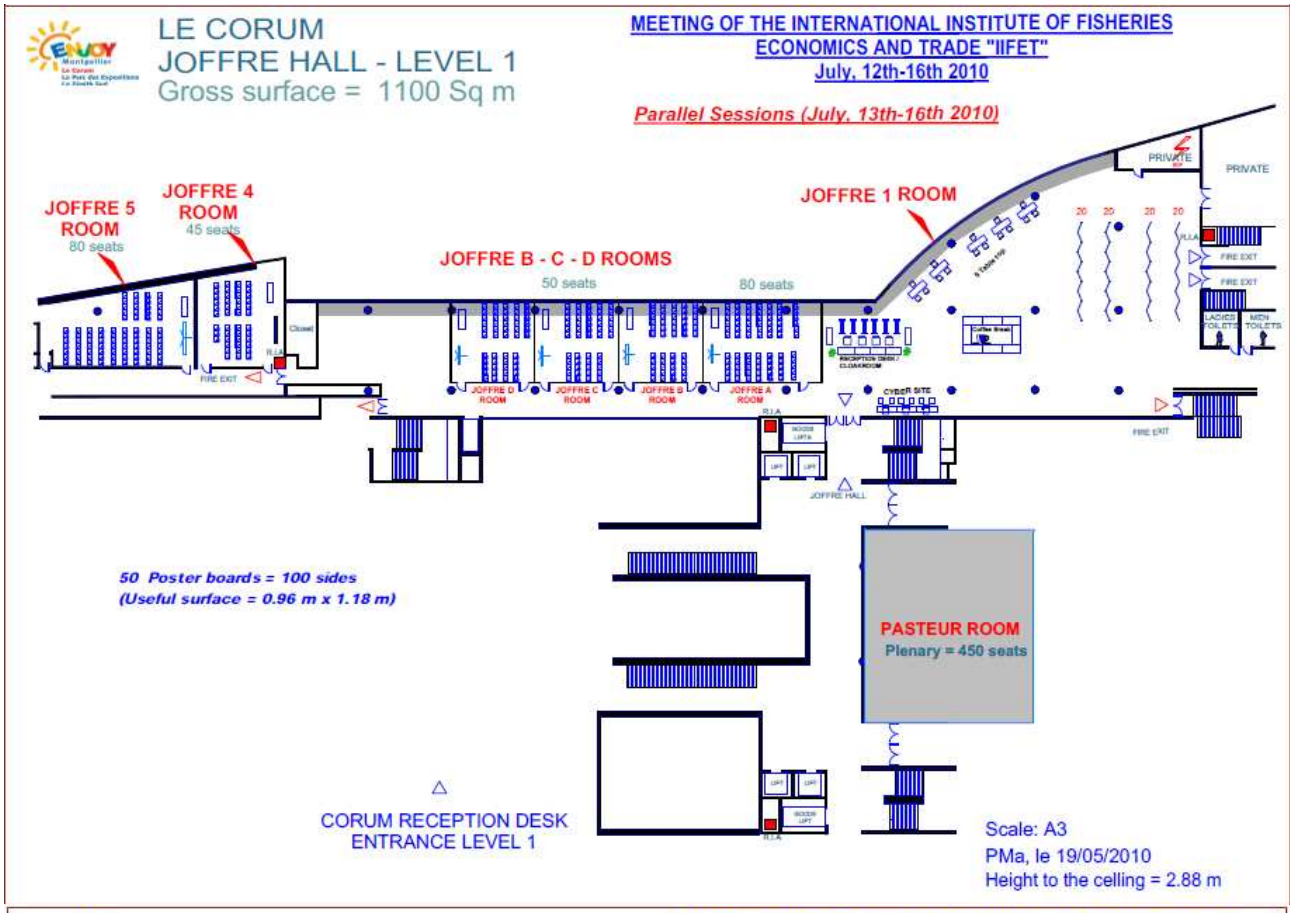
Free access in Joffre Area during all the conference. Participants can use their own laptops for wireless internet access in Joffre Area.
Electricity in France 220 V AC, 50 Hz.

Accommodation

Cité Universitaire de la Colombière
570 Route de Ganges
34096 Montpellier
Cedex 05
Tél (00 33) 4 67 04 28 48 Fax (00 33) 4 67 54 56 74
E-mail : http://www.crous-montpellier.fr/cite-universitaire-colombiere_272
- From the railway station: take tramway line 1 (blue), direct, in the direction of "Mosson". Stop at "Hopital Lapeyronie".
- From the aiport: take the airport shuttle to Place de l'Europe, and then tramway line 1 (blue), direct, in the direction of "Mosson". Stop at "Hopital Lapeyronie".
The University student accommodation is across the street from the La Colombière tramway station. Please use the small bridge to cross the highway.

Corum




LE CORUM
JOFFRE HALL - LEVEL 1
Gross surface = 1100 Sq m
MEETING OF THE INTERNATIONAL INSTITUTE OF FISHERIES
ECONOMICS AND TRADE "IIFET"
July, 12th-16th 2010
Parallel Sessions (July, 13th-16th 2010)
JOFFRE 5 ROOM
80 seats
JOFFRE 4 ROOM
45 seats
JOFFRE 1 ROOM
JOFFRE B - C - D ROOMS
50 seats
80 seats
PRIVATE
50 Poster boards = 100 sides
(Useful surface = 0.96 m x 1.18 m)
PASTEUR ROOM
Plenary = 450 seats
CORUM RECEPTION DESK
ENTRANCE LEVEL 1
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PMa, le 19/05/2010
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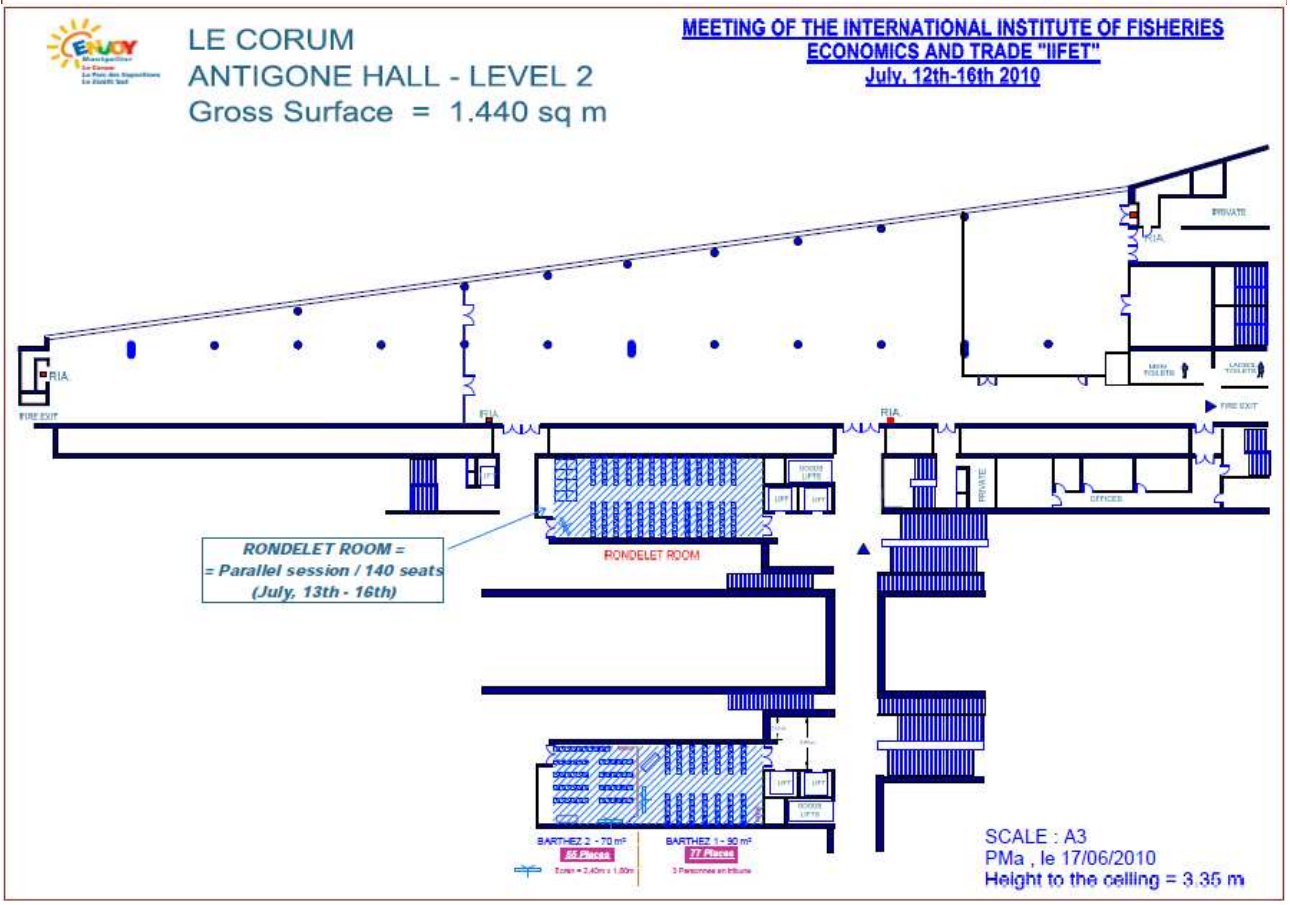
LE CORUM
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Gross Surface = 1.440 sq m
MEETING OF THE INTERNATIONAL INSTITUTE OF FISHERIES
ECONOMICS AND TRADE "IIFET"
July, 12th-16th 2010
RONDELET ROOM =
= Parallel session / 140 seats
(July, 13th - 16th)
RONDELET ROOM
BARTHEZ 2 - 70 m²
BARTHEZ 1 - 90 m²
SCALE : A3
PMa , le 17/06/2010
Height to the celling = 3.35 m

General information for authors and for moderators

Dear moderators,

If you are moderator, we would ask you to consider the following points when chairing your session.

Time:
We have provisionally allocated 15 minute for each presentation, which allows 10 minute for presentation itself and five minute for questions and answers. Where time permits in a session, you may use the time available at your discretion. If you have fewer than 5 papers scheduled in your 90 minute session, you will have some extra time to allocate. You are encouraged to use extra time in creative ways that encourage interaction between the presenters and the audience, such as impromptu panel. However, we would ask you to ensure that your session does not exceed its allocated time.

Presentation:
Each presentation will be given to you by the presenter five minutes before your session in the conference room.
We suggest that you give yourself 5-10 minutes before your session starts in order to familiarize yourself with the room, the equipment and the presenting author.
Moderators are encouraged to provide input to Ann.L.Shriver@oregonstate.edu after the conference, describing their experiences and providing constructive input for future conferences.

Dear authors,

Oral presentation Instructions
Talks will be scheduled in 15 minute time-slots including questions. The time limit must be strictly enforced to facilitate movement between sessions, and to ensure that everyone has a fair and equal chance to speak. Presentation rooms will be equipped with a video projector, computer with a mouse, screen.For PowerPoint or PDF presentations (PC or MacIntosh), we encourage you to use text parsimoniously and to give priority to clear graphic presentations.

Instructions for poster presentation
The poster exhibition will be placed in Joffre area (a central open space within the conference center) and posters will be exhibited in two sessions.

Poster session:

Wednesday, 10:00 > 11:30, Joffre Area
Friday, 9:45 >11:15, Joffre Area

Setup time will be provided on Monday afternoon and Tuesday morning. Please take your poster down on Friday before 17:30.
Posters will be placed on vertical poster boards and the size of your poster board will be 118*96 cm (height * width) (A0).
Your poster number will be displayed with large printed figures in the upper corner of the poster board. Material to be used to mount your poster will be provided by the congress staff in the poster exhibition area.
The presenting author should be present at the poster during the poster sessions. In addition, at least one of the authors of the poster is asked to be present at the poster board during as many coffee breaks as possible, to allow direct discussion with interested congress participants.
The congress staff will remove posters not taken down on time. However, the Congress organizers cannot take any further responsibility for the material (that is, we will be unable to mail your poster back to you.)

Honors, prizes and awards

Distinguished Service Award: This award, established in 1994, is given by the IIFET Executive Committee to an individual who has made significant contributions and had an important effect on the ability of individuals from around the world in academia, trade and government, to exchange information, data, and perspectives on fisheries issues. Contributions to the theory and/or application of economic science to international fisheries industries, trade, management, and/or policy are also considered.

IIFET 2010 Distinguished Service Award Winner: **Susan S. Hanna**, Professor, Oregon State University, USA

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IIFET Fellow Award: IIFET's first "Fellow" award will be given at IIFET 2010 Montpellier. This award is given to an individual who has made substantial, long-term, ongoing contributions to the advancement and development of economic theory and analysis in the areas of fisheries/aquaculture economics and/or seafood trade. Achievements may be evidenced by significant research contributions, but potential subsequent policy impacts are also considered.

IIFET's First Fellow: **Anthony Scott**, Professor Emeritus, University of British Columbia, Canada

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Best Student Paper Prize: This prize was established in the year 2000. Student authors from all countries are eligible to compete for this prize, offered by IIFET for the best paper submitted by a student on any fisheries or aquaculture economics topic, at each biennial conference. This year's prize, supported by the US National Marine Fisheries Service (NMFS), includes a $500 award check, a $2000 travel stipend, and free conference registration.

IIFET 2010 Best Student Paper Winner: *Growth Overfishing*
by **Florian Diekert**, University of Oslo, Norway
First Honorable Mention: *The Dynamic Efficiency Costs of Common-Pool Resource Exploitation*
by **Ling Huang**, University of British Columbia, Canada

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Developing Country Aquaculture Economics Best Student Paper Prize: Student authors from all countries writing on topics related to the economics of the aquaculture sector in developing countries are eligible to compete for this award. Supported by the AquaFish Collaborative Research Support Program (AquaFish CRSP), this year's award includes a $500 check, a $2000 travel stipend, and free conference registration.

IIFET 2010 DCAEBSP Winner: *Impact of Sanitary and Phytosanitary (SPS) measures on Indian Seafood Industry: A Macro and Micro Level Analysis*
by **Jayasekhar Somasekharan,** Centre for Development Studies, India

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JIFRS-Yamamoto Prize: This award, established in 1984 by Dr. Tadashi Yamamoto, is offered to IIFET Conference participants by JIFRS (The Japan International Fisheries Research Society). Participants from developing countries presenting a paper which is encourages the rational development of responsible national fisheries in their own country are eligible. This year's prize includes a $500 check, and a travel support grant of $1000 from JIFRS.

First Prize*: Estimating the Economic Benefits of Cooperative and Non-cooperative Management of Illex Argentinus Fishery in the Patagonian Large Marine Ecosystem*
by **Sebastian Villasante,** University of Santiago de Compostela, Spain
Second Prize: *A System of Indicators to Understand the Socioeconomic and Ecological Interactions and Manage the Fisheries Sustainability*

by **Djiga Thiao,** Centre de Recherches Océanographiques de Dakar-Thiaroye (CRODT), Senegal, and **Francis Laloe,** IRD, France

Honorable Mention: *Organizational Strategies in the Seafood Supply Chain of Yucatan, Mexico*
by **Carmen Pedroza,** Universidad Nacional Autónoma de México (UNAM)

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Organization for Economic Cooperation and Development (OECD) Prize for Best Policy Paper: This prize, established in 2008, is awarded for the paper that most successfully addresses a contemporary fisheries policy issue, based on strong economic analysis and providing sound advice to policymakers. Eligible papers address issues in either OECD or non-OECD countries and cover any aspect of fisheries policy. The prize, sponsored by the OECD, includes a $500 check, a certificate, and publication of the paper in the OECD Working Paper series.

Winner: *Multi-jurisdiction Quota Enforcement for Transboundary Renewable Resources*
by **Rodney Beard**, Groupe Sup de Co and **Linda Nøstbakken,** University of Alberta

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Aquaculture Economics Professional Travel Awards: These awards are offered by the IIFET Secretariat, with financial support from the AquaFish CRSP. Non-student author/participants from developing countries writing on aquaculture economics-related topics are eligible to apply for these awards, which provide varying levels of partial travel stipends, plus free conference registration. Candidates are selected based on the quality of an extended abstract.

2010 AEPTA Awardees: **Giap Nguyen, Taiwo Mafimisebi,** and **Indah Susilowati**

Programme

Abbreviations:

SS	Special Session
FM	Fisheries Management
FA	Economics of fishing activities
AQ	Aquaculture Economics
MO	Modelling
MA	Markets and marketing of seafood products
TI	Transversal issues

PROGRAMME at a glance

Monday 12/07

17:30>19:30	Registration (Joffre Area)

Tuesday 13/07

8:00>8:45	Registration (Joffre Area)							
8:45>10:45	Opening Ceremony (Auditorium Pasteur)							
10:45>11:15	Coffee Break (Joffre Area)							
	Room Joffre A	Room Joffre B	Room Joffre C	Room Joffre D	Room Joffre 4	Room Joffre 5	Room Barthez 1	Room Rondelet
11:15>12:45	FM Fishing rights	SS Global ocean fisheries	SS Recreational fishing	SS Integrated modelling	MO Fisheries modelling	AQ Aquaculture development	FA Fisheries dynamics	FA Contribution of fisheries to socioeconomic wellbeing
13:00>14:30	Lunch (Central Room)							
	Room Joffre A (	Room Joffre B	Room Joffre C	Room Joffre D	Room Joffre 4	Room Joffre 5	Room Barthez 1	Room Rondelet
14:30>16:00	FM Fishing rights	SS Rebuilding fisheries	SS Recreational fishing	SS Integrated modelling	MO Fisheries modelling	AQ Aquaculture development	FA Fisheries dynamics	FA Contribution of fisheries to socioeconomic wellbeing
16:00>16:30	Coffee Break (Joffre Area)							
	Room Joffre A	Room Joffre B	Room Joffre C	Room Joffre D	Room Joffre 4	Room Joffre 5	Room Barthez 1	Room Rondelet
16:30>18:00	FM Fishing rights	SS Fisheries aid	FA Recreational fishing	FM Fisheries indicators	MO Fisheries modelling	AQ Aquaculture structures and management	MA Consumers behavior	FA Contribution of fisheries to socioeconomic wellbeing
18:30>20:30	Cocktail (Salon Citadelle Corum)							

Wednesday 14/07

8:00>10:00	Plenary Session (Auditorium Einstein) "Fisheries economics in theory and in support of fisheries policies" Sott Anthony / Hanna Susan							
10:00>11:30	Poster Session and coffee break (Joffre Area)							
	Room Joffre A	Room Joffre B	Room Joffre C	Room Joffre D	Room Joffre 4	Room Joffre 5	Room Barthez 1	Room Rondelet
11:30>13:00	FM Fishing rights	SS Bycatch reduction	SS Yamamoto prize	FM Fisheries indicators	MO Fisheries modelling	AQ Aquaculture and environment	MA Prices determination	FA Contribution of fisheries to socioeconomic wellbeing
13:00>14:30	Lunch (Central Room)							
	Room Joffre A	Room Joffre B	Room Joffre C	Room Joffre D	Room Joffre 4	Room Joffre 5	Room Barthez 1	Room Rondelet
14:30>16:00	FM Fishing rights	FM Bycatch, discard, selectivity	SS Yamamoto prize (2)	FM Fisheries indicators	TI Climate change	AQ Contribution of aquaculture to socioeconomic wellbeing	MA Prices determination	FA Small scale fisheries
16:00>16:30	Coffee Break (Joffre Area)							
	Room Joffre A	Room Joffre B	Room Joffre C	Room Joffre D	Room Joffre 4	Room Joffre 5	Room Barthez 1	Room Rondelet
16:30>18:00	FM Fishing rights	FM Bycatch, discard, selectivity	FM Fisheries and coastal zone management	FM Fisheries indicators	TI Climate change	AQ Contribution of aquaculture to socioeconomic wellbeing	MA Markets and labels	FA Small scale fisheries

Thursday 15/07

8:00>10:30	Plenary Session (Auditorium Einstein) "Fisheries economics, ecosystem and biodiversity" Garcia Serge Michel / Weber Jacques and Prizes/Awards							
10:30>11:00	Coffee Break (Joffre Area)							
	Room Joffre A	Room Joffre B	Room Joffre C	Room Joffre D	Room Joffre 4	Room Joffre 5	Room Barthez 1	Room Rondelet
11:00>12:30	FM Fisheries management plans	FM Bycatch, discard, selectivity	FM Fisheries and coastal zone management	SS Food security	TI Value of ecosystem services	AQ Aquaculture efficiency and management	MA Markets and labels	MO Fisheries modelling
12:30>14:00	Lunch (Central Room)							
	Room Joffre A	Room Joffre B	Room Joffre C	Room Joffre D	Room Joffre 4	Room Joffre 5	Room Barthez 1	Room Rondelet
14:00>15:30	FM Fisheries management plans	SS Marine conservation	FM Fisheries and coastal zone management	SS Productivity measurement	TI Value of ecosystem services	AQ Aquaculture efficiency and management	MA Supply and value chains	FA Bioeconomic analysis of fisheries
15:30>16:00	Coffee Break (Joffre Area)							
	Room Joffre A	Room Joffre B	Room Joffre C	Room Joffre D	Room Joffre 4	Room Joffre 5	Room Barthez 1	Room Rondelet
16:00>17:30	FM Enforcement of fisheries management rules	FM Ecosystem-based approach to fisheries management	SS Co-management		TI Marine protected areas	AQ Aquaculture and risk	MA Supply and value chains	FA Bioeconomic analysis of fisheries
18:30>24:00	Departure by bus to banquet (Level 0 Corum Berlioz Gate)							

Friday 16/07

	Room Joffre A	Room Joffre B	Room Joffre C	Room Joffre D	Room Joffre 4	Room Joffre 5	Room Barthez 1	Room Rondelet
08:00>09:45	FM Taxation of the fishing industry	FM Fisheries and environment	FM Fisheries co-management	SS Forage fish (1)	TI Marine protected areas	AQ Aquaculture and risk	SS Global Tuna	FA Fishers behavior
9:45>11:00	Poster Session and coffee break (Joffre Area)							
	Room Joffre A	Room Joffre B	Room Joffre C	Room Joffre D	Room Joffre 4	Room Joffre 5	Room Barthez 1	Room Rondelet
11:00>12:30	FA Risk and uncertainty in the fishing industry	FM Fisheries and environment		SS Forage fish (2)	TI Marine protected areas	MA Seafood processing and international trade	SS Global Tuna (2)	FA Fishers behavior
12:30>14:00	Lunch (Central Room)							
	Room Joffre A	Room Joffre B	Room Joffre C	Room Joffre D	Room Joffre 4	Room Joffre 5	Room Barthez 1	Room Rondelet
14:00>15:30	FA Risk and uncertainty in the fishing industry	FM Subsidies to the fishing industry		SS Forage fish (3)		MA Seafood processing and international trade	SS Global Tuna (3)	FA Fishing capacity and buyback programs
15:30>16:00	Coffee Break (Joffre Area)							
16:00>17:30	Closing Ceremony (Auditorium Einstein)							

Oral presentation programme

Aquaculture Economics

AQ01:Aquaculture development

Tuesday 13/07 11:15

Kim Anh Nguyen	Recommendations to Ensure the Vietnam Pangasius Sustainable Export in the World Market
Jingjie Chu	Factors affecting U.S. Aquaculturists intended actions to expand production capacity abroad: why is the U.S. Aquaculture industry leaving?
Nerissa Salayo	The need for synergy in small-scale fisheries and aquaculture towards sustainable grouper fisheries and trade in the coral triangle area: the case of the Philippines
Nicole Franz	A report on the oecd workshop on advancing the aquaculture agenda: policies to ensure a sustainable aquaculture sector

AQ02:Aquaculture development

Tuesday 13/07 14:30

Sebastian Villasante	Is aquaculture production growing in latin america and the Caribbean?
Reuben Adeolu Alabi	Effect of trade and agricultural policies on fish trade and production in Nigeria
Stefan Guettler	Benefits from R&D and Spill-overs in Aquaculture: An EU-15 Modelling Approach
Seamus McElroy	Does Financing an Aquaculture Start-up Company make Commercial Sense? The Case of Australias Clean Seas Tuna Ltd.

AQ03:Contribution of aquaculture to socioeconomic wellbeing

Wednesday 14/07 14:30

Manas Mohan Adhikary	Potential utilization of aquatic ecosystem through IT and TOT system for updating productivity and economic stability for fishing communities in Indian sub-continent
Khondker Jahan	Food security through aquaculture development: Lessons from Bangladesh and Malawi
Isabelle Vagneron	How can aquaculture contribute to the poor? Evidence from brackish-water extensive polyculture in the Philippines
Veronica Lango	Socioeconomic impact of a gathering and distribution centre for live tilapia in veracruz, mexico

AQ04:Contribution of aquaculture to socioeconomic wellbeing

Wednesday 14/07 16:30

Kolawole Ogundari	Is Aquaculture a Sustainable Source of Food and Income in Nigeria?
Poulomi Bhattacharya	Role of Shrimp Farming in Generating Employment and Income: A Study of Small- scale Shrimp Farming in West Bengal, India
A.B.M. Mahfuzul Haque	Impacts of Community- Based Fish Culture in Seasonal Floodplains on Livelihoods in Bangladesh
Maria Victoria Espaldon	Seaweed Farming and its Contribution to Sustainable Livelihood in the Philippines

AQ05:Aquaculture efficiency and management

Thursday 15/07 11:00

Edward Onumah	Performance of Fish Farms in Ghana - A Stochastic Frontier Approach
Taiwo Ejiola Mafimisebi	Measuring Technical Efficiency of Farmed Catfish Production in Southwest, Nigeria: A Stochastic Frontier Production Function Approach
Ajao Olajide	Technical efficiency of urban fish farming in oyo state-nigeria
Aslina Nasir	Performance of the Malaysian States in Aquaculture Production
Mohottala Gedara Kularatne	Optimal Allocation of Water Resources in Sri Lanka: The case of Reservoir-Based Rice Farming and Culture-Based Fisheries Development

Aquaculture Economics

AQ06:Aquaculture efficiency and management

Thursday 15/07 14:00

Albert Esobhawan	Economic efficiency of aquaculture production in Edo state, Nigeria.
Gaspar Poot-Lopez	Bioeconomic analysis of ration size in Nile tilapia feeding: an example of Yucatan, Mexico
Juan Hernandez	Optimal harvesting time in aquaculture assuming nonlinear size-heterogeneous growth
Mohammad Mahfujul Haque	A comparative analysis of financial and development impacts of two hatchery approaches to promote Nile tilapia in Northwest Bangladesh

AQ07:Aquaculture structures and management

Tuesday 15/07 16:30

Poulomi Bhattacharya	Determinants of Land Leasing Decisions for Shrimp Farming: A Case Study from of Small-holders Shrimp Farming in India
Rini Kusumawati	The governance of shrimp production and trade: case study on shrimp farming and trade in Tarakan, East Kalimantan, Indonesia
John A. Theodorou	Optimal Farm Size for the Production of the Mediterranean Mussel (Mytilus galloprovincialis) in Greece
Sophie Girard	Impact of cultural practices on the individual and collective economic performances in shellfish farming: the case of oyster farming in Baie des Veys

AQ08:Aquaculture & risk

Thursday 15/07 16 :00

Giap Nguyen	U.S. Catfish Farm Supply under Uncertainties
Patrice Loisel	Faustmann Rotation and Aquaculture in the presence of an epidemic risk
Paul McLeod	Economic modelling of a large-scale offshore aquaculture farming facility growing yellowtail kingfish in Western Australia suggests such a facility makes commercial sense.
John A. Theodorou	Risk Perceptions and Risk Management Strategies of the Greek Mussel Farmers

AQ09:Aquaculture & risk

Friday 16/07 8:00

Le Bihan Veronique	The limits of risks hedging in aquaculture: The case of shellfish farming in France.
Abdulai Fofana	Estimating the economic cost of viral salmonid disease in UK aquaculture
John A. Theodorou	Risk Assessment of the Mediterranean Seabass and Seabream Industry in Greece: A Stochastic Simulation Approach Based on Insurance Claims

AQ10:Aquaculture & environment

Wednesday 14/07 11:30

Aminur Rahman	Economic costs of shrimp culture in coastal bangladesh
Syndhia Mathé	Approach to co-construction of sustainable development indicators in aquaculture
Yajie Liu	An Ecological-Economic Simulation Model of Genetic Interaction between Farmed and Wild Salmon
Tihomir Ancev	Shrimp Production Costs and Returns in Bangladesh: A Step Towards Evaluation of Environmental Impacts
Rasmus Nielsen	Technical Efficiency in Danish Fresh Water Trout Farms: Taking Pollution into account

ID93: Bycatch reduction

Wednesday 14/07 11:30	Joshua Abbott	What are we Protecting? The Side-effects of Spatial Closures as a Tool to Mitigate Fisheries Bycatch
	Alan Haynie	The design of hybrid individual incentive mechanisms for bycatch reduction
	Alan Haynie	From mobile closures to individual incentives: Chinook salmon bycatch reduction efforts in the Bering Sea pollock fishery
	James E. Wilen	Incentive Systems for Reducing Bycatch in the Alaska Pollock/Salmon Fishery
	Daniel S. Holland	Markets, Pooling and Insurance for Managing Incidental Catch in Fisheries

ID75:Co-management

Thursday 15/07 16:00	Diemuth Pemsl	Co-management interventions in developing countries: findings from a global meta-analysis
	Mafaniso Hara	Impact of Fisheries Co-management on Livelihoods and Conservation in Southern Africa
	Robert Pomeroy	Measuring Transaction Costs of Fisheries Co-Management
	Joshua Cinner	A quantitative analysis of co-management success across the Indo-Pacific

Economics of fishing activities

FA01:Bioeconomic analysis of fisheries

Thursday 15/07 14:00	Dyhia Belhabib	Price flexibility analysis for the lobster fishery for the optimisation of the net profit value of small fishing communities
	Dan Holland	Optimizing Intra-annual Harvest in the Maine Lobster Fishery
	Marjolaine Fresard	Bioeconomic modelling of the Bay of Saint-Brieuc Scallop Fishery (France)
	Inga Wigdahl Kaspersen	Bioeconomic Analysis of the Norwegian Redfish Fishery in the Barents and Norwegian Sea

FA02:Bioeconomic analysis of fisheries

Thursday 15/07 16:00	Sophie Gourguet	A stochastic viability approach for ecosystem-based management of mixed fisheries: the case of the Bay of Biscay demersal fisheries.
	Claire Macher	Addressing the distribution of bio-economic impacts of management measures between fleets: the case of the demersal fisheries in the bay of Biscay
	Rene Cerda-D'Amico	Bioeconomic Dynamic Modelling Of The Chilean Southern Groundfish Fishery
	Abdoul Cisse	A bio-economic model for the viable managementof the coastal fishery in French Guyana

FA03:Fisheries dynamics

Tuesday 13/07 11:15	Janofsky	Technical Change in a Malaysian Purse Seine Fishery: Implications for Development and Resource Management
	Daniel Gordon	The Norwegian Winter Herring Fishery: A Story Technological Progress and Collapse
	Pascal Le Floc'h	Technological switching in the Fisheries Sector
	Maria Onestini	Economics of Argentine Fisheries: Costs, Benefits and Balancing Sustainable Management in a Developing Country Context
	César Arias de León	Why the Mexican oyster fishery in the Gulf of Mexico is underdeveloped?

Economics of fishing activities

FA04:Fisheries dynamics

Tuesday 13/07 14:30

Ben Gilbert	Measuring Technological Change in Artisanal Fisheries: Evidence from Malaysia
Thorir Sigurdsson	A tale of two crises: Socioeconomic Comparison of Iceland´s Herring Collapse in 1968 and Banking Collapse in 2008
Ralf Doering	Economics of the Recovery of Fish Stocks: Comparison of a NPV Calculation of a Recovery Strategy with the real Development of the Baltic Cod Fishery
José-María Da-Rocha	Evaluation of recovery plans based on a rational expectation model: an application to the Southern Hake fishery

FA05:Fishing capacity and buyback programs

Friday 16/07 14:00

Garth Holloway	Estimating the Efficiency Effects of a Fisheries Buyback
David Castilla Espino	Fishing Capacity of Georgian anchovy fishery
Louisa Coglan	Impacts of Vessel Capacity Reduction Programs on Efficiency in Fisheries: The Case of Australia's Multispecies Northern Prawn Fishery
Aaron Mamula	Bidder Learning in Sequential License Buyback Auctions: A Model of the Texas Shrimp License Buyback Program

FA06:Risk and uncertainty in the fishing industry

Friday 16/07 11:00

Maria Rebecca Campos	Adaptation of Fishing Communities in the Philippines to the Impacts of Climate Change
Michael De Alessi	Measuring the Effects of Quota Rights on Biological and Economic Sustainability in the New Zealand Lobster Fishery
Eric Thunberg	Measuring Fishing Vessel Safety and Risk Taking
Rebecca Metzner	Uncertainty and Risk in the Ecosystems Approach to Fisheries Management: Some Insights from an Ecosystem Computer Simulation Model
Silvia Salas	Coping strategies under uncertain environment: the case of Mexican coastal fishers

FA07:Risk and uncertainty in the fishing industry

Friday 16/07 14:00

Seamus McElroy	Western rock lobster fishery: a case study in fisheries management from success? To recruitment failure? And where to now?
Richard Woodward	Toward capturing model uncertainty in bioeconomic models
Niels Vestergaard	Assessing Risk and Uncertainty in Fisheries Rebuilding Plans
Chris Kennedy	Fishery management when biological and economic uncertainties are correlated.
Thi Thanh Thuy Pham	The Effect Of Remuneration System On The Economic Performance Of Small Scale Vessels- The Case Of Purse Seining In The South Central- Vietnam

FA08:Fishers' behavior

Friday 16/07 8:00

Silvia Salas	Spatial allocation of fishing effort discriminated by fishing gear in a multi-species fleet
Sonia Jarvis	Location Uncertainty in Random Utility Models: Determining the Value of Coral Reefs
Kirsten Abernethy	Fishing for what? Fisher decision making in the South-west of England
Louise Teh	Time Discounting Behaviour of Small-Scale Fishers in Open Access and Traditionally Managed Reef Fisheries
Devarahandhi De Silva	An Attitude approach to measure the Entrepreneurial Profile of Sri Lankan Fisher Folk: An untold story

Economics of fishing activities

FA09:Fishers' behavior

Friday 16/07 11:00

Emmanuelle Quillerou	What is behind Fleet Evolution: application of a Flow Analysis to the French fisheries?
Soile Kulmala	A meta-analysis of fisheries fleet dynamics models: the techniques and theoretical approach used, the variables included, and the policy purpose of the models.
Heleen Bartelings	Capital Utilization and Investment decisions: a case study for the Netherlands
Marcos Pérez-Pérez	Estimating a supply function for the Galician fleet in the Celtic Sea Fishery
Paul McLeod	Expected Catch Rate and Recreational Fishing Effort: Implications for Management in the Western Australian West Coast Demersal Fishery

FA10:Smallscale fisheries

Wednesday 14/07 14:30

Niang Ndeye Astou	Sustainable management of fishery resources and development in Africa: Sustainable management of artisanal fisheries and local development in Senegalese coast facing the globalization of fish market.
Peter Britz	Governance Challenges facing African Fisheries
Akhmad Fauzi	The Java Sea small-scale fisheries in changing environment: Experiences from Indonesia
Jean-Michel Sourisseau	Managing Small-Scale Fisheries Confronted with Socio-Economic Changes in New Caledonia (South Pacific)

FA11:Small scale fisheries

Wednesday 14/07 16:30

Claire Macher	Mediterranean fishing strategies and interactions between small scale fisheries and trawlers in the Mediterranean hake Fishery
Pazhani Kanthiah	Small-Scale Fisheries Transition To Sustainable And Responsible Fishing In India - A Micro Level Study
Justin Hospital	Economic And Social Characteristics Of The Hawaii Small Boat Fishery
Zuzy Anna	Do financial assistances properly address small scale fisheries problems?: The case of small-scale fisheries of the North Coast of Java.
Francis Laloë	Small Scale Fisheries Analysis in a Sustainable Development Perspective.

FA13:Recreational fishing

Tuesday 13/07 16:30

Daniel Lew	How Do Harvest Rates Affect Angler Trip Behavior?
James Hilger	Demand Heterogeneity for Southern California Sportfishing Trips
Sonia Jarvis	Fishing for the Truth: An Examination of the Effects of Task Complexity on Choice Experiment Responses for Recreational Fishing Management
Jon Olaf Olaussen	Does the Recreational Angler care? Escaped Farmed vs Wild Atlantic Salmon
Seamus McElroy	The recreational fishing story a role for the economist because conventional biological and effort restrictions are not enough

FA14:Contribution of capture fisheries to socioeconomic wellbeing

Tuesday 13/07 11:15

Chris Bene	Is the Wealth-Based Approach really Appropriate for Small-Scale Fisheries in the Developing World? An Alternative Perspective
Max Thilo Stoeven	Consumer surplus in fisheries
Taiwo Ejiola Mafimisebi	Poverty Analysis in Households with Fish-based Livelihoods Strategies in the Riverine Areas of Southwest Nigeria
Gabe Dunham	Value-Driven Rent Dissipation in Limited-Entry Fisheries: Experimental Evidence

Economics of fishing activities

FA15:Contribution of capture fisheries to socioeconomic wellbeing

Tuesday 13/07 14:30

Ingrid Kelling	Food security through aquaculture development: Lessons from Bangladesh and Malawi
Ling Huang	Worldwide Returns to Fisheries Management Expenditures
Takamune Fujii	Tragedy of the Commons and International Trade: Case of International Fisheries
Taiwo Ejiola Mafimisebi	Contribution of Children in Artisanal Fisheries to Poverty Alleviation in Ondo State Nigeria

FA16:Contribution of capture fisheries to socioeconomic wellbeing

Tuesday 13/07 16:30

Rashid Sumaila	The need to Clarify Fisheries Economics
Chris Bene	Assessing Vulnerability in Small-Scale Fishing Communities
Chin-Hwa Jenny Sun	Global Tuna Demand, Price Response and Management: A Summary of Global Tuna Demand Workshop in La Jolla, CA on May 13-14, 2010

FA17:Contribution of capture fisheries to socioeconomic wellbeing

Wednesday 14/07 11:30

Voisin Sylvestre	Environmental and Socio-Economical Impacts of the Peruvian Anchoveta Supply Chains: work plan and first results
Kieran Kelleher	Lessons from reform of Peru's anchoveta fishery
Lamine Mbaye	Generating and sharing resource wealth in the Senegalese deep-water shrimp fishery: how to build a win-win public and private partnership (PPP)?
Håkan Eggert	Welfare Effects of Fisheries Boom in Lake Victoria

ID91:Fisheries Aid

Tuesday 13/07 16:30

Either Mr Bortey or Mr Nunoo	African Fisheries Development Aid: Country Case-Study (1): Ghana
Boubacar Bâ	African Fisheries Development Aid: Country Case Study (2): Senegal
Fiona Nunan	African Fisheries Development Aid: Country Case-study (3): Uganda

Fisheries management

FM01:Bycatch, discards, selectivity

Wednesday 14/07 14:30

James Hilger	A Multivariate Poisson Approach to Estimating Target Catch and Bycatch Production
Daniel Georgianna	Managing Technical Interactions in an Ecosystem: Confronting Bycatch Limits in a Closed Fishery
Basil Sharp	By-catch management in ITQ fisheries
Florian Diekert	Growth Overfishing
Sean Pascoe	Compensatory mitigation: an alternative solution to seabird bycatch in fisheries?

Fisheries management

FM02:Bycatch, discards, selectivity

Wednesday 14/07 16:30

Philippe Lallemand	The Economics of Discarding in the New Zealand Fisheries
Trevor Hutton	Ecosystem-wide impacts of alternative bycatch reduction strategies: an ecological-economic assessment of the Australian Southern and Eastern Scalefish and Shark Fishery
Sean Pascoe	Incentive-based management of bycatch: using quota markets to conserve seabirds
Alan Haynie	Market-based size selection in the Bering Sea pollock fishery

FM03:Bycatch, discards, selectivity

Thursday 15/07 11:00

Viktoria Kahui	Hookers sea lion bycatch in New Zealand
Kathryn Bisack	Protecting Marine Mammals in the U.S: Tradeoffs between public and private costs
Soile Kulmala	Optimal management of conflicting species:Grey Seal (Halichoerus grypus) and
Niels Vestergaard	Towards development of biological-economic evaluation tool in fishery policy: Cost-effectiveness analysis of protecting species in a multi species fishery

FM04:Ecosystem based approach to fisheries management

Thursday 15/07 16:00

Ayeisha Brinson	Demonstrating the evolution towards ecosystem management in Regional Fishery Management Organizations
Stephen Kasperski	Optimal Multispecies Harvesting Targets in Biologically, Technologically, and Temporally Interdependent Fisheries
James Wilen	Fishing Down the Food Chain: modelling Trophic Interactions in Exploited Marine Ecosystems
Ruth Pincinato	Seafood market-series as fishing pressure indicators for an EAF: a historical multispecies analysis of the São Paulo wholesale market, SE Brazil
Lijie Duan	Simulating the effect of seasonal fishing moratorium on the fisheries in the Pearl River Estuary coastal ecosystem for fisheries strategies exploration

FM05:Fisheries & environment

Friday 16/07 8:00

Mitsutaku Makino	Fisheries Management under Species Alternation: case of the Pacific purse seiner off Japan
Michele Baggio	Analysis of the Determinants of Stock Collapse: The Case of the American Lobster Fishery of Long Island Sound
David Castilla Espino	Microeconomic influence of Marine Environment Conditions on red seabream fishery of the Strait of Gibraltar
Juan Carlos Seijo	Optimizing dynamic catch quotas in stock fluctuating fisheries

FM06:Fisheries & environment

Friday 16/07 11:00

Michele Baggio	Welfare Effects of Random Fishery Closures
Ikerne del Valle Erkiaga	Quantifying the prestige oil spill over effect on the basque fishing industry
Olivier Thébaud	Global economic and environmental changes and fisheries viability: the case of the French Guyana shrimp fishery
Martin Smith	Economic Impacts of Hypoxia on North Carolina Brown Shrimp

FM07:Fisheries & CZM

Wednesday 14/07 16:30

Medha Gunawardhana	A new arena of fisheries: An examination of sustainable fisheries development in war affected Northeastern Sri Lanka.
Gilles Van de Walle	The european fisheries fund and axis 4: a territorial approach to fisheries support in the eu
Noel Roy	The fishery as an economic base industry after the Newfoundland cod moratorium
Devarahandhi De Silva	How do community partnerships create capital? social capital, donor dependency and rehabilitation efforts of the tsunami affected fishing communities

Fisheries management

FM08:Fisheries & CZM

Thursday 15/07 11:00

Jörg Berkenhagen	Marine spatial planning and fisheries: the potential economic losses for fisheries in the context of competing interests in coastal zones
Cameron Speir	Measuring Differential Changes in Commercial Fishing Ports: A Shift-share Analysis of North-Central California
Olivier Guyader	Moored Fishing Aggregating Devices exploitation by Small-Scale Fleets in the Caribbean: Review and Outlook after 20 years.
Sherry Larkin	WTP for Artificial Reefs in Florida by Residents, Boat Owners, and the For-Hire Sector

FM09:Fisheries & CZM

Thursday 15/07 14:00

Monica Galligan	Modelling economic effects of fishery regulations
Marie Lesueur	Diversification of fisheries activities and construction of sustainability
Julia Fraga	Risk and Uncertainty in Yucatán (México) Fisheries Sector: Gradual transition to the third economy through tourism development

FM10:Fishing rights

Tuesday 13/07 11:15

Yutaro Sakai	Econometric analysis of the factors contributing to the fish price increase in coastal TURFs in Japan: the case of the income pooling fishery for coastal shrimp Sakuraebi (Sergia lucens)
Rolv Dahl-Jørgensen	The Norwegian Structural Policy - Maintaining Productivity Growth with a Limited Natural Resource.
Haruko Yamashita	Why Aged Fishers do not Retire Social Welfare and Overall Profits to the Industry?
Min-Yang Lee	Bargaining Power in the Market for Input Permits: The Case of Northeast US Multispecies Days-At-Sea
George Kailis	The Private Fishery - and Reality

FM11:Fishing rights

Tuesday 13/07 14:30

Keisaku Higashida	Efficiency of Individual Transferable Quotas (ITQs) when Fishers are able to Choose Vessel Sizes: An Experimental Approach
Jacob LaRiviere	Profit Sharing in Renewable Resource Industries: Implications and Optimal Management
Aaron Hatcher	ITQ Markets in a Fishery with Crew Shares
Gordon Gislason	Capital and Labour Interests under ITQ Fisheries Management : Lessons for Policy-makers

FM12:Fishing rights

Tuesday 13/07 16:30

Ralph Townsend	Applying deemed value concepts to other cap-and-trade rights
Katell Hamon	The effect of trade limitation in a fishery managed through individual transferable quotas
Ingrid Van Putten	Rock lobster lease quota market: a network analysis

FM13:Fishing rights

Wednesday 14/07 11:30

Philip Logan	A Simple Matter of Herring Fishery Management
Kari MacLauchlin	The Inner Workings of a Market for Transferable Fishing Rights in the Florida Spiny Lobster Fishery
Gunnar Knapp	Dynamics of Permit Transfers in Alaska Salmon Fisheries

Fisheries management

FM14:Fishing rights

Wednesday 14/07 14:30

Ingrid Van Putten	An economic analysis of structural changes in the Tasmanian rock lobster industry after ITQ introduction
Charmaine Marie Gallagher	Production Costs in Developing Fisheries under ITQs: The New Zealand King Clam Fishery
Barbara Rountree	The Northeast United States tilefish fishery: recent lessons from catch shares

FM15:Fishing rights

Wednesday 14/07 16:30

Ben Gilbert	Economic Efficiency and Sector Allocations in the New England Groundfish Fishery: a Comparison of Sector and Non-sector Vessel Performance
Lee Anderson	Operational Excessive Share Protocols for Catch Share FMPs under MSRA
Hirotsugu Uchida	Modelling the Collision of Two Different Management Regimes: When Catch Share System Meets Common Pool Fishery
Christopher Anderson	An Experimental Analysis of Harvest Timing in Fisheries with Sectors Managed by Different Methods
Andrew Scheld	Economic Evaluation of a Catch Share Program: Evidence from Rhode Island Fluke Fishery Sector Pilot Program

FM16:Fisheries Management plans

Thursday 15/07 11:00

Florence Galletti / C. Chaboud	Series of institutional and legal reforms in the fishery sector facing general governance crisis, a Malagasy example
Le Kim Long	On the Shared Fisheries in South China Sea and Possible Strategies for Vietnams Fisheries
Sebastien Metz	The Revised Cod Recovery Plan: a Change in the European Fisheries Paradigm?
Abdoulkarim Esmaeili	Cluster Industry, a Procedure for Fishery and Aquaculture Management in Iran
Sebastian Villasante	Global assessment of the Common Fisheries Policy through TAC regulation

FM17:Fisheries Management plans

Thursday 15/07 14:00

John Simmonds	The benefit of 20-20 hindsight; an Evaluation of North Sea Herring Management Plans from 1995 to the present.
Catherine Barrett	Managing the transition to Sustainable and Responsible Fisheries- an Irish case study
Elkana Ngwenya	Reflecting on Recommendations Based Purely On Observations Made While Prawn Trawling in the Gulf of Carpentaria, Northern Prawn Fishery, Australia: By-catch, Quotas, Fuel Subsidies and Other Policy Matters
Lionel KINADJIAN	Advantages and issues in using a fishery management plan approach in developing countries: lessons from Mauritania and Senegal

FM18:Enforcement of fisheries management rules

Thursday 15/07 16:00

Ragnar Arnason	Optimal Dynamic Enforcement of a Fishery
Itziar Lazkano	Capacity and Non-compliance in a Quota Regulated Fishery
Ragnar Arnason	Fisheries Enforcement When Avoidance Is Possible

FM19:Fisheries indicators

Tuesday 13/07 16:30

Stephen Stohs	An Economic Approach to Optimizing the Level of Observer Coverage
Bruce Shallard	Resource Assessment Surveys as the Basis for Effective Fisheries Management
Christopher Cusack	Can Simpler Assessment Techniques Save Fish, Time, and Money?
Ikerne del Valle Erkiaga	The Evolution Of Fish Biodiversity: A Time Series Approach

Fisheries management

FM20:Fisheries indicators

Wednesday 14/07 11:30

Sylvie Van Iseghem	Economic data collection in the fisheries sector from 2001 to 2009 in France: a support for scientific advice regarding the common fisheries policy
Ron Felthoven	Socioeconomic Data for fisheries off Alaska: Current Status and Needs
Paul Ma	Jobs and Income Indicators of Canada's Fishing Industry
Jonathan Stilwell	Sustainable development assessment and the management of heterogeneous fisheries activities: the case of European Union participation in Senegal's marine fishery

FM21:Fisheries indicators

Wednesday 14/07 14:30

David Sampson	Simulation Model Evaluation of Some Fisheries Balance Indicators
Sigrid Lehuta	Fishery-based indicators of management impact : assessing relevance and robustness using a bio-economic simulation model
Andrew Kitts	Defining Social & Economic Performance Measures for Catch Share Systems
James Anderson	Wealth-based Fishery Performance Indicators (FPI) for the Evaluation and Cross-Country Comparison of Management Systems

FM22:Fisheries indicators

Wednesday 14/07 16:30

Scott Steinback	An Assessment of Two Approaches for Measuring Commercial Fishery Dependency
Abdoulkarim Esmaeili	Economic Analysis of Fishery in the Northern Persian Gulf
Duy Ngoc Nguyen	Economic Performance of Open-Access Offshore Fisheries: The Case of Gillnet Vessels in Khanh Hoa, Vietnam
Lalith Amaralal	Deep sea fishing in Sri Lanka

FM23:Taxation of the fishing industry

Friday 16/07 8:00

Ali Emami	The Survival of Cultures: Preemptive Compensation, Natural Resources And Poverty
Ragnar Arnason	On the Economic Distortion of Pure Resource Rent Taxation
Martin Smith	Combining Property Rights and Landings Taxes to Mitigate the Ecological Impacts of Fishing
Jason Murray	Can a 'Feasible' Rent Collector Earn his Hire?

FM24:Subsidies to the fishing industry

Friday 16/07 14:00

Thanh Thi Duy Pham	Fisheries Subsidies and Their Implications, Case Studies of Fuel Subsidy Programs in Taiwan and Vietnam
John Anderson	Profit or loss? The extent of subsidisation in the EU fishing fleet.
Naomi Foley	The Irish Orange Roughy Fishery: An Economic Analysis
Natacha Carvalho	Estimating the Impact of Cost-reducing and Capacity-enhancing Fisheries Subsidies Cuts on the Small Island Economy of the Azores

FM25:Fisheries co-management

Friday 16/07 8:00

Erwin Rathnaweera	Rethinking of Co-management in small scale fishery in Sri Lanka
Mustafa Md Golam	Co-management and rights-based approach to fisheries governance-lessons from Bangladesh.
Takumi Mitani	Choice of organization managing and utilizing Japanese coastal resources using AHP technique
Ha Xuan Thong	Co-management : the most efficient and effective management solution for fisheries of small side reservoir
A.K.M. Firoz Khan Khan	Co-Management in Capture Fisheries is the Effective way of Establishing Property Rights of the Poor Fisher in Bangladesh

ID74:Food Security

Thursday 15/07 11:00	Nozomi Kawarazuka	The role of fish for food and nutrition security: a review
	Max Troell	Aquaculture and Food Security can Fish farming fill the Gap?
	Helga Josupeit	Assessing the progress on fish and food security in Peru
	Joeri Scholtens	Dollars, Work and Food: Understanding dependency on the fisheries and aquaculture sector.

ID52:Forage Fish

Friday 16/07 8:00	Roganvaldur Hannesson	Strictly for the Birds? A Note on the Ecosystem Effects of the Collapse of the Pacific Sardine
	Ben Fissel	Cointegration: A Tool for Ecosystem-based Conservation and Management of Fisheries
	Samuel Herrick Jr	Analysis of Price Response in the U.S. Pacific Sardine Fishery
Friday 16/07 11:00	Samuel Herrick Jr	The Effect of the Environment on California□s Commercial Fisheries
	Porter Hoagland	An Integrated Economic-Ecological Framework for Ecosystem-Based Management of Fisheries in New England
	Gakushi Ishimura	Fishing games under climate variability: Transboundary Management of Pacific sardine in the California Current System
Friday 16/07 14:00	James Hilger	Characterization of the California Live Bait Fishery
	Rashid Sumaila	Forage fish in the California Current Large Marine Ecosystem: Ecological linkages, current catches and values
	John Walden	A preliminary ecosystem assessment for Atlantic sea herring (Clupea harengus): ageneral equilibrium framework

ID44:Global ocean fisheries

Tuesday 13/07 11:15	Rashid Sumaila	Current worldwide contribution of marine fish to human welfare
	Andrew Dyck	Potential contribution of global marine fishery resources to human welfare
	Gordon Munro	The Way Forward
	Panel	Panel discussion

ID39:Global economics of tuna fisheries

Friday 16/07 8:00	Minling Pan	Tuna price in response to changes of market structure and ecosystem conditions - price linkage between hawaii and japanese tuna sashimi markets
	John Kennedy	Bargaining solutions for access to straddling and migratory tuna stocks between pacific island countries and distant water fishing nations
	Ramón Jiménez-Toribio	Artisanal fisheries and consequences of the international trade of bluefin tuna
	Chin-Hwa Jenny Sun	Asymmetric externalities of the tuna longline and tuna purse-seine fisheries in the eastern pacific ocean
Friday 16/07 11:00	Rémi Mongruel	Turning a fish into a brand: a century of rent-seeking strategies in the tuna canning industry
	Eric Janofsky	On the maximum economic yield for the wcp tuna fisheries
	Campling	Shadow price of bigeye in global tuna fisheries
	kathleen Miller	Asset ownership, climate variability and policy design: game theoretic insights on tuna management outcomes
	Harry Campbell	Bioeconomic modeling and management of the southern bluefin tuna fishery
Friday 16/07 14:00	Panel	Panel discussion

ID90:Integrated Modelling

Tuesday 13/07 11:15	Donata Melaku Canu	Ecological impact, sustainability and socio-economic analysis of long line mussel-farming in the gulf of Trieste
	Anna Sustersic	Sustainability and socio-economic analysis of long line mussel-farming in the Gulf of Trieste. Tools for development of production sector
	Jean-Marc Douguet	Evaluating the social costs of fishing activities in a deliberative perspective
Tuesday 13/07 14:30	Pierre Failler	Societal costs of fishing practices and fishery policies; the ecost approach
	Pascal Raux	Fisheries and aquaculture management within the scope of system approach; a review of experiences, limits and advantages
	Rémi Mongruel	Modelling of aquaculture economics under system approach: insights from the French study sites of the SPICOSA project

ID92:Marine conservation

Tuesday 13/07 14:30	Nicolas Pascal	Effects of MPA on small scale coral reef fisheries and communities: evidence from Vanuatu (South Pacific).
	Thomas Binet	The valuation of marine ecosystems in West Africa: a tool for decision-making in ecosystems management and MPA governance
	Gilbert David	The non biological productions of MPAS as a major driver marine resources conservations governance
	Christian Chaboud	Conservation policies and changes in the economic status of activities and marine resources: the case of marine protected areas in French Polynesia.

Markets and marketing of seafood products

MA01:Consumer behavior

Tuesday 13/07 16:30	Muni Reddy	An Economic Analysis of Low value species as an alternative nutritional source in strengthening food security in India
	Marie Lesueur	Behaviour, motivations and needs of consumers of fresh seafood products : new opportunities and marketing strategies
	José Fernández-Polanco	Consumers knowledge and preferences about fish farmed species
	Catherine Mariojouls	Study of public perception in france about a potential fortuitous import of genetically modified fish

MA02:Prices determination

Wednesday 14/07 11:30	Taiwo Ejiola Mafimisebi	Spatial Equilibrium, Market Integration and Price Exogeneity in Dry Fish Marketing in Nigeria: A Vector Auto-Regressive (VAR) Approach
	Thong Tien Nguyen	Supply and demand analysis for mussels in the EU market
	Chin-Hwa Jenny Sun	Inverse Demand Analysis of the Tuna Sashimi Market in Japan: An Application of Scaling in the Rotterdam Inverse Demand System

MA03:Prices determination

Wednesday 14/07 14:30	Jinghua Xie	Modelling market structure of the spanish salt fish market
	Tamaki Morita	Eco-labeled seafood in japanese market: how does information affect consumers perceptions of eco-labeled seafood?
	Thong Tien Nguyen	Hedonic prices for mussels in European market

MA04:Markets and labels

Wednesday 14/07 16:30	Francois Tiotsop	The role of trust in the exchange relationship: The case of the Kribi fish market in Cameroon
	Cormier-Salem Marie-Christine	Ecolabelling in Fisheries along West African Coast: the Potential and Pitfalls
	Tsutom Miyata	The effect on product differentiation by origin labeling of seafood
	Rémi Mongruel	Market segmentation in relation to supply structural changes: the case of the seabass market in France

Markets and marketing of seafood products

MA05:Markets and labels

Thursday 15/07 11:00

Hiroki Wakamatsu	Revealing Potential Demand for Eco-labeled Seafood in Japanese Seafood Market
Haja Razafimandimby	What willingness to pay on the French market for an ecolabelled shrimp?
Avdelas Lamprakis	Seafood Labelling and Consumers Choices
James Young	Fish sustainability information schemes: a global comparative assessment and their implications.

MA06:Supply and value chains

Thursday 15/07 14:00

Kate Barclay	Globalization and Sustainability in Tuna Commodity Chains
Funmilola Omolara Agbebi	Fish Marketing and Food Security in Nigeria
Ingrid Kelling	Market Dynamics and Governance in Global Aquaculture Value Chains: Chaining Producers?
Jordi Guillen	Testing for Market Power and Functioning of the Spanish Seafood Supply Chain
Tunazzina Sultana	Role of Mobile Telecommunication in Efficient Marketing System and Economic Develoment: A Study on Fishing Commuity in Bangladesh

MA07:Supply and value chains

Thursday 15/07 16:00

Helgi Gestsson	The Value chain of Yellow fin tuna in Sri Lanka
Ögmundur Knútsson	A comparison of the Icelandic Cod value chain and the Yellow fin Tuna value chain in Sri Lanka
Olafur Klemensson	The role of fish-markets in the Icelandic value chain of Cod
Torbjorn Trondsen	Value chain structure and performance in the salted cod markets
Ahmed Khan	A Market Chain Analysis of Northern Gulf Cod Fisheries Pre- and Post Collapse: Implications for Resource Sustainability and Economic Viability

MA09:Seafood processing and international trade

Friday 16/07 11:00

Dalia Nóhpal	Feasibility study of production oyster flavored smoke
Christina Stringer	Changing trends in offshore processing: implications for the New Zealand seafood industry
Glenn Simmons	SME growth and entrepreneurial capabilities: a Penrosian approach to the seafood processing industry
Chen Sun	The Analysis on the TEE of China Export Aquatic Products and the Export Trend to Japan
Dengjun Zhang	The Impact of Exchange Rates and Risk on U.S. Sablefish Imports

MA10:Seafood processing and international trade

Friday 16/07 14:00

Giap Nguyen	Seafood Import Demand and its Impact on Caribbean Fisheries Production
Jayasekhar Somasekharan	Quantifying the impact of sanitary and phytosanitary (SPS) measures on Indian seafood industry: The Case of Kerala, South India
Lionel Dabbadie	Compliancy with EU food law and changes in the Philippines' shrimp aquaculture chain
Brad Gentner	Exploration of United States Domestic Economic Impacts of the CITES Appendix I Listing for Bluefin Tuna.
Fu-Sung Chiang	An Analysis of Impact of Tariff Reduction in the Non-Agriculture Market Access Negotiations in the WTO Doha Round on the Fisheries Sector in Taiwan

Modelling

MO01:Modelling

Tuesday 13/07 11:15

Raul Prellezo	Existing Bioeconomic Models Review
Ling Huang	Measuring the Dynamic Efficiency Costs of Common-Pool Resource Exploitation
Peder Andersen	Optimal Management under Asymmetric Information: A Principal-Agent Analysis
Run Yu	Employing pattern-oriented modelling strategy in devloping agent-based model of socio-economic systems: the experience from hawaii□s longline fishery

MO02:Modelling

Tuesday 13/07 14:30

Margrethe Aanesen	The 2012 revision of the Common Fisheries policy (CFP): Consequences of ecosystem based management and increased NGO influence
Fabian Zimmermann	A bioeconomic view on size-related harvesting: Does size matter?
Stein Ivar Steinshamn	Generalization of Age-structured Models in Theory and Practice
Narine Udumyan	Incorporating Habitat Dynamics into Bioeconomic Model of Fishery. Application to Artificial Reefs

MO03:Modelling

Tuesday 13/07 16:30

Olivier Thébaud	A model of fishing through fish communities
Michel De Lara	Sustainable Yields for Ecosystems. A Mathematical Viability Approach
Hector Ramirez	Evaluation of Management Procedures: Application to Chilean Jack Mackerel Fishery
Marko Lindroos	Parallel Agreements in Fisheries Management

MO04:Modelling

Wednesday 14/07 11:30

Elkana Ngwenya	The Fleet Dynamics Component of the MNL Markov and SUR Markov Models of Managing Australia's Northern Prawn Fishery (NPF)
Olivier Thébaud	Ecological, Economic and Social Viability of ITQ Management Systems
Diana van Dijk	Multiannual Adjustment of Fish Quota under Costly Capital Adjustment and Stochastic Bycatch
Marko Lindroos	Stability and success of regional fisheries management organizations

MO05:Modelling

Thursday 15/07 11:00

Luc Doyen	Viable coalitions in open-access
Ola Flaaten	A Stackelberg Analysis of the Potential for Cooperation in Straddling Stock Fisheries
Linda Nøstbakken	Multi-jurisdiction Quota Enforcement for Transboundary Renewable Resources
Richard Curtin	Viability of transboundary fisheries and international quota sharing
Itziar Lazkano	Past and Future Management of a Collapsed Fishery: The Anchovy in the Bay of Biscay

ID503:Essays in Productivity Measurement in honor of Jim Kirkley

Thursday 15/07 14:00

Dale Squires	Firm Behavior Under Quantity Controls: A Virtual Quantity Analysis of Input Regulation and Capital Stuffing in a Malaysian Fishery
John Walden	Measuring Productivity Change in the Mid-Atlantic Surfclam Fishery
Sean Pascoe	Assessing Opportunity And Relocation Costs When Considering Marine Protected Areas Using A Behavioral Model of Longline Fleet Dynamics
Rebecca Metzner	Are Spatial Incentives More Cost Effective than Marine Protected Areas for Conserving Biodiversity?

ID33:Rebuilding fisheries

Thursday 15/07 14:00	Saba Khwaja	Policy Approaches to rebuilding fisheries across the OECD
	Rebecca Lent	Not provided
	Dan Holland	Management Strategy Evaluation and Management Procedures: Tools for Rebuilding and Sustaining Fisheries
	Sherry Larkin	Practical Considerations in Using Bioeconomic Modeling for Rebuilding Fisheries
	Frank Meere	Fisheries rebuilding challenges for RFMOs

ID5:Recreational fishing

Tuesday 13/07 11:15	Brad Gentner	Creation of Guidelines for Assessing Social and Economic Benefits of European Inland Recreational Fisheries European Inland Fisheries Advisory Commission (EIFAC) Occasional Paper No. 45.
	Heather Bowen	Summer Flounder Allocation Analysis.
	Paul McLeod	Economic Approach to Fisheries Management and Allocation with Short Run Diminishing Stocks
	Joshua Abbott	Understanding Rent Dissipation and Optimal Management in Recreational Fisheries: Theory
	J.M. Gates	Indirect Benefits and Fisheries Management
Tuesday 13/07 14:30	Robert Lindner	The role of recreational fisher modelling in the assessment of management options for Australia's west coast demersal fishery
	James Hilger	Wall Street or Pacific Stocks? An Analysis of the Historical Drivers of Sportfishing Demand
	Max Thilo Stoeven	A microeconomic foundation for recreational effort functions
	Daniel Talhelm	Predicting Resource Management Benefits by Simulating Angler Demand and Supply Responses
	Olivier Thébaud	Evaluation of management strategies in Ningaloo Marine Park, Western Australia

Transversal issues

TI01:Climate Change

Wednesday 14/07 14:30	Nils-Arne Ekerhovd	North-East Arctic Cod Model
	Lisa Pfeiffer	Climate Change and Fisher Behavior in the Bering Sea Pollock Fishery
	Øystein Hermansen	Norwegian salmonid farming and global warming: Spatial distribution and value adding
	Frank Millerd	Arctic Fisheries: Potential Management Issues and Opportunities

TI02:Climate Change

Wednesday 14/07 16:30	Md. Muzaffar Ahmed	Climate Change and Fisheries in Bangladesh: Impacts and Adaptations in the Context of Marginal and Poor Fishers
	Ana Norman-López	Economic impacts of climate change on Australian fisheries and associated sectors by 2030
	Rüdiger Voss	Optimal Management of the Baltic Sea Fishery under Climate Change: an Ecological-Economic Age-Structured Multi-Species Model Analysis

TI03:Value of ecosystem services

Thursday 15/07 11:00	Elizabeth Smith	Consumer Preferences for Coastal Restoration: Ecosystem Services and Individualized Pricing in an Experimental Auction Market
	Claire Armstrong	TEV (Total Economic Value) Analysis of a Marine Environment in Norway

Transversal issues

TI04:Value of ecosystem services

Thursday 15/07 14:00

Kristy Wallmo	An Application of Stated Preference Non-Market Valuation to Value Improvements to Threatened and Endangered Species
Kristen Lucas	Marine Dependence and WTP for Red Tide Prevention, Mitigation, and Control Strategies in Florida
Michael Harte	A Bayesian Decision Framework For Identifying and Evaluating Ecosystem Service Tradeoffs For Marine Protected Areas

TI05:Marine protected areas

Thursday 15/07 16:00

Christian Chaboud	A spatial bioeconomic model of West Indian Ocean Tuna Fisheries. Assessing MPAs relevance for highly migratory species
Rosemary Kosaka	Fishing Effort Response to a Spatial Closure: Rockfish Conservation Area in California
James Innes	What do MPAs Actually Cost Fishers and are Estimates of Forfeited Gross Value of Product an Adequate Proxy Measure?
Ola Flaaten	Protected Areas for Conflict Resolution and Management of Recreational and Commercial Fisheries

TI06:Marine protected areas

Friday 16/07 8:00

L. Rich Little	The Complementarity of No-take Marine Reserves and Catch Shares for Managing the Coral Reef Line Fishery of the Great Barrier Reef
Jean Yves Weigel	Impact of marine protected areas to fishery profitability and income distribution. Evidence from the Gulf of Thailand (Chumphon Province)
Frédérique Alban	Assessing the Impact of MPAs on Recreational Uses of a Marine Ecosystem: the Case of the □Côte Bleue□ Marine Park (France)
Lionel Kinadjian	The economic value of exclusive use rights in subsistence fisheries: case study of the Marine Protected Area (MPA) of the National Park of Banc d'Arguin (PNBA) in Mauritania

TI07:Marine protected areas

Friday 16/07 11:00

Jean Boncoeur	Assessing the socio-economic impact of marine protected areas on local fishing communities. Two West-African case studies.
Nobuyuki Yagi	Coastal marine protected areas in Japan and their institutional characteristics
Fernando Nieto Conde	Artisanal fisheries in Palamós - economic indicators - Marine Protected Areas
Roberto R Enríquez-Andrade	The role of MPAs in the development of Northwest Mexico fisheries

Yamamoto Prize

Wednesday 14/07 11:30

Sebastian Villasante	Estimating the economic benefits of cooperative and non-cooperative management of illex argentinus fishery in the Patagonian marine ecosystem
Djiga Thiao	A system of indicators to understand the socioeconomic and ecological interactions and manage the fisheries sustainability
Carmen Pedroza	Organizational strategies in the seafood supply chain of Yucatan, Mexico
Naohiko Watanuki	Senegal's challenge towards fisheries co-management

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Joseph Olumide	O.	Budgeting Analysis Of Catfish Marketing In Ondo State, Nigeria	3
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Gasca-Leyva	E.	Economic analysis of polyculture Tilapia and Australian Redclaw Crayfish	5
Tran Thi	H.	Economic and Institutional constraints to development of Marine Fish Cage Culture in Viet Nam	6
Ngwenya	E.	Assessing Micronutrient Deficiency as Part of Meeting Millennium Development Goals for Fish Growing Households in Vietnam and the Papua New Guinea	7
Olaniyi	C.	Economic Evaluation, Growth performance and Nutrient Utilization of Rumen content in the Nutrition of African catfish (Clarias gariepinus) Burchell, 1822	8
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ABSTRACTS

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1. Oral presentations (plenary sessions and concurrent sessions)
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Abstracts are organized by theme. Sessions are included in alphabetical order by session title (See Contents page 1). Within sessions, abstracts are presented in order of scheduled presentation.

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Oral Presentations

Plenary sessions

Plenary session
Wednesday 14th, Room Einstein, 8:00

Fisheries economics in theory and in support of fisheries policies

Scott, Anthony
Hanna, Susan
Moderator: Tony Charles

Plenary session
Thursday 15th, Room Einstein, 8:00

Fisheries economics, ecosystem and biodiversity

Garcia, Serge Michel
Weber, Jacques
Moderator: Jean Boncoeur

Fisheries economics in theory and in support of fisheries policies

Sixty years of fishery economics

Scott Anthony, Professor Emeritus, adscott@interchange.ubc.ca

This paper takes the form of a personal review of the history of fishery economics. The subject was not exactly new in the 1950s. Adam Smith, for one, had actually mentioned the fishery. His aim, however, was merely to analyse the incidence of a subsidy, to strengthen his analysis of a tax. Authors of economic history, too, have long mentioned the fishery. Their aim, however has been to use the trade in fish, and in salt, to illustrate international mercantilism and "agricultural commercialism." Neither economists nor historians dwelt on the fishery as having its own special economic characteristics. To them the fishery seems to have been like mining, an extractive industry shipping its products to outside markets. Toward the end of this long period the occasional economist (Jens Warming; G.M. Gerhardsen) has anticipated parts of Gordon's insight; but really no real fisheries-economic paradigm appeared. Then some writers in and out of economics (Jim Crutchfield; Ralph Turvey; M.B.Schaefer; Donald White; Zellner,) stimulated by Hardin's "Tragedy of the Commons" worked with Scott Gordon's new approach. They were few in number, however, considering the numbers that have followed. The paper arrives at the 1960s and after. Economists contributing to "fishery economics" were more numerous. What were they doing? Some took standard economic concepts and deepened and strengthened Gordon's model. Some asked old questions from agricultural economics and other fields. Members of a third group asked new fishery questions, about regulation, property rights, self-government, pollution, environmentalism, international cooperation and conflict. The final question is about the direction of influence. Is the fishery still largely the source of new problems and concepts applicable elsewhere in economics? Or is it largely the beneficiary of concepts already worked out by economists working on other applications? This question, from Thomas Kuhn, concludes the paper

Anthony Scott

Anthony Scott born in Vancouver in 1923, holds degrees from the University of British Columbia, Harvard University and the London School of Economics, He was a faculty member (for a while, head) of the UBC economics department. His publications have centred on the economics of natural resource management: conservation and the conservation movement, the life of the mine, stream pollution by mining (with Harry F. Campbell), forest management, and environmental jurisdiction (with Albert Breton.) His most recent book was the / Evolution of Property Rights of Natural Resources/ For 50 years he worked on fisheries, following 1955's "The Fishery: The Objectives of Sole Ownership."
He also has worked on the measurement of capital stocks (with Wm. C. Hood), the economics of federalism (with Albert Breton) and the economics of human capital migration, or "brain drain." (with Herbert Grubel..)

Economics in the Service of Fisheries Policy and Practice

Hanna Susan, Professor, Department of Agricultural and Resource Economics, Oregon State University
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The world of fisheries is complex, dynamic and contested. At its core lie fundamental economic issues such as valuation and ownership. The failure to understand these issues and to address the challenges they present is at the heart of fishery mismanagement and non-sustainability. Fishery economists have much to offer to the understanding and resolution of these problems, but our full potential for contribution is not being realized. Probably the least visible option for contribution is service. The premise of this talk is that service represents a value proposition for strengthening fishery policy and practice, but is underutilized by fishery economists as an avenue of influence.
Service can take a number of forms – service to professional organizations, conferences and journals most prominent among them. In this presentation I talk about another type of service – educational outreach to management systems, agencies, industries and the public – and the value potential it carries for the sustainable and profitable management of fisheries.

I discuss the gap between economics' present position of relatively minor importance to fishery policy and practice vs. its potentially major contribution. I describe the existing analytical context of economics in fishery management, noting the relatively circumscribed role economics plays. I talk about the potential for economics to contribute to the resolution of a wider range of fishery problems, and the risk of not having this perspective represented in the policy and practices that matter.

The marketplace of ideas includes strong competition to shape the thinking about a number of emerging fishery issues. These present educational outreach opportunities to fishery economists. As illustration I focus on three issues areas of active interest: property rights, communities and ecosystem-based management. I look at how these issues have entered the public arena and assess the relative success of economists in influencing related policy and practice. In this context, I consider economic information as a product with a value chain that can be lengthened through service applications. I acknowledge that service can be expensive in personal time and energy; it is a process of frontloading costs in the expectation of longer-term benefits. The challenge is to direct our service investments to areas that will generate benefits that exceed the costs, strengthen the integration with fishery policy and practice, and contribute to the economic vitality and sustainability of fisheries.

Susan Hanna

Susan Hanna is professor of marine economics at Oregon State University, affiliated with the Coastal Oregon Marine Experiment Station and Oregon Sea Grant. Her research and publications are in the area of fishery management and policy. She has served as a scientific advisor to numerous natural resource agencies and organizations.

Fisheries economics, ecosystem and biodiversity

Science, governance, ethics and the ecosystem approach to fisheries: collision or co-evolution of the fisheries and conservation governances?

Garcia Serge Michel**,** Aranova (Roma), Garcia.sergemichel@gmail.com

At the onset of the third millennium, the world fisheries science, governance and operations are changing as the Ecosystem Approach to Fisheries (EAF) is slowly being implemented amidst a flurry of prophecies envisioning cataclysms of biblical magnitude that recall the situation at the end of the first millennium, when humans were confronted to the perspective of Armageddon. The current interaction between science, governance and values echoes century-old debates, underlining both the fundamental societal importance of the current crisis and its position in the historical quest for improvement in the relation between humans and Nature. The **New Atlantis** utopia developed by Francis Bacon in the 17th century as a model of perfect society living in harmony with Nature, rested on improved knowledge, wise government, and religious values. Replacing religious values by ethics, the similarity with EAF principles, is striking.
The recognition of the degree of complexity characterizing the fishery systems (and ecosystems in general) and the limitations of the human knowledge (scientific and traditional) as well as the recognition of the failures of past governance models are shaping a new "good governance" model. This model intends to replace the illusory top-down control of Nature by a yet-to-be-tested bottom-up decision-making that adapts to Nature. It calls for a **New Alliance** (sensu Prigogine) between natural and social sciences, and between them and society through more integrated advisory processes.
EAF implies also a more explicit and effective integration of conservation objectives in fisheries policy and practices. The cataclysmic prophecies related to the future of fisheries and of the Earth environment and biodiversity are accompanied by a sharp increase in the momentum of conservation and environmental policies and management. While the close interaction between fisheries and Nature are evident, the interaction of the rather well defined fishery governance institutions and the fuzzy galaxy of institutions involved in conservation governance is nebulous, poorly formalized and evolving rapidly. Despite the obvious cross-influence reinforced by the common concept of **sustainable use**, the coherence of the two governance processes and their outcomes in terms of fisheries viability, food security, protection of vulnerable species and habitats as well as equity in the distribution of benefits and costs is not ensured.
The near future of conservation and fisheries has been coined as an alternative between **fusion** and **collision**. A superficial examination of the evolution of their respective governance principles and practices point in fact to a parallel evolution, under the influence of similar drivers, making the same mistakes at about the same time. They both largely failed in meeting their objectives because of the difficulty in controlling the use of Nature by human. They both had to shift from a "single species" to an "ecosystem approach" and are both struggling today with the concept of biodiversity and face the conundrum of climate change, rising human populations and globalization. They both have extremists and are both facing the same future options in terms of the world within which they will operate.

Serge Michel Garcia

Dr. Serge Michel GARCIA holds a PhD in shrimp population dynamics and management. He worked for IRD (ORSTOM) from 1968 to 1979 and for FAO from 1979 to 2007, heading the Marine Resources Service and the Fisheries Resources Divisions. He contributed to the conception and development of the FAO Code of Conduct, fishery sustainability indicators, precautionary and ecosystem approaches to fisheries, fisheries ethics, the Fisheries Global Information system (FIGIS) and the UN Atlas of the Oceans.

Concurrent sessions

Regular session

Aquaculture economics

Recommendations to ensure the vietnam pangasius sustainable export in the world market

ID paper: 17

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Pangasius culture in recent years has proved its ability to contribute to national wealth and prosperity. As far as domestic consumption is concerned, pangasius represents an important source of nutrient intake for a large portion of the population. Multiple effects have been generated through large-scale exports, which is associated with foreign currency earnings, job creation and income enhancement. However, producers and exporters have come under increasing challenges given volatile prices and prohibitive technical barriers that prevail in the international pangasius trade. Negative implications from these external factors are widely observed at national-, business- and individual levels. Suggestions to unravel the bottlenecks are therefore necessary to boost the overall performance of the whole sector. Complementary to these efforts, the article will focus on enhancing the pangasius exporting industry by applying the expert method and the Five Forces model introduced by Michael E. Porter. It is hoped that thorough analyses followed by realistic recommendations from the paper serve as one important source of inputs for informed policy making among industry think-tankers. Key words: Vietnam pangasius exporting industry, expert method, M. Porter s Five Forces Model

Aquaculture Economics/AQ01
Aquaculture development

Factors affecting u.s. aquaculturists intended actions to expand production capacity abroad: why is the u.s. aquaculture industry leaving?

ID paper: 129

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This paper examines the relationship between U.S. aquaculturists intended actions to expand production capacity abroad and the factors influencing their choices. These factors include aquaculturists perceptions of market conditions; regulatory climate; property rights; government leadership; and the comparative advantages of U.S. aquaculture, as well as the demographic characteristics of aquaculturists and their farms. Primary data were collected via an original online survey. Both multinomial probit and probit models identify the factors affecting aquaculturists intended actions to expand abroad. The results indicate that large-scale, non-shellfish (e.g., finfish, salmon, or shrimp), less-educated, marine aquaculturists with high expectations about seafood demand during the next three years; who think U.S. permit and environmental regulations are strict; that aquaculture leases should be transferable; and that the U.S.A. has comparative advantages in skilled labor availability and access to the domestic markets, are more likely to expand their operations abroad. The results provide guidance for U.S. policy makers to help retain aquaculture entrepreneurs and investors domestically.

The need for synergy in small-scale fisheries and aquaculture towards sustainable grouper fisheries and trade in the coral triangle area: the case of the philippines

ID paper: 324

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The Philippines, located within the Coral Triangle which represents the epicenter of marine life abundance and diversity, is the source of groupers traded in Hongkong, China, Singapore and other countries. Grouper production in the country (19.7 th mt), gross value (USD 5.8 mil) and trade value (USD 14.4 mil) is small, growing only at 1.5% annually from 1995-2007 in spite of high demand. Production remains dependent from wild fisheries (98%) primarily contributed by small-scale fishers. Low production (2%) from aquaculture is due to insufficient juvenile supply. The need for more seeds is emphasized with present government concerns to revolutionize fish production and create jobs. There is greater need to evaluate the implications of continuing exploitation of wild marketable groupers (14,500 t/year) and fry (2 gross tons) for grow-out culture on the sustainability of grouper fisheries. An industry survey showed that a synergy between small-scale fisheries and aquaculture can secure grouper fisheries, fishing livelihoods and overall heath of marine environment. Aquaculture could help reduce fishing pressure through improved broodstock management and hatchery productivity. This will address present problems: 1) limited investments in juvenile production due to high cost of maintaining broodstocks and long investment period; 2) erratic spawning and survival rates of juveniles; and 3) preference for wild-caught (e.g. Epinephelus leopardus) vs aquacultured groupers (E. coioides) which intensifies harvesting from the wild. Meanwhile, the maintenance of healthy fishery habitat through sustainable fishing practices among small-scale fishers provides viable environment for juveniles from aquaculture.

A report on the OECD workshop on advancing the aquaculture agenda: policies to ensure a sustainable aquaculture sector

ID paper: 352

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The aquaculture sector is uniquely placed to complement production from the stagnating capture fisheries sector asand it has advantages in terms of controllable production characteristics. However, aquaculture poses undeniable economic, environmental and social challenges that may be poorly evaluated or inadequately addressed within current policy frameworks. In such cases, the sustainability of future operations may be compromised. Issues that may constrain the sector development and performance include the business environment (e.g. competing uses of land and water; introduction of new technologies to improve the overall economic efficiency of aquaculture to better exploit natural conditions) and administrative and regulatory structures that can create constraints rather than underpin further aquaculture developments (e.g. regulation of access to resources; environmental prescriptions). With a view to collect further evidence and analysis on the issues confronting aquaculture development the OECD Committee for Fisheries is hosting a major international workshop in April 2010. The objective of the workshop is to provide a platform for policy makers, technical experts, international organizations, the private sector and NGOs to examine policy challenges that OECD governments face in aquaculture development. The event will inform policy makers, in particular in OECD countries, about critical economic, environmental and social aspects of the aquaculture sector as well as analyse interactions with other sectors. This paper will present the key outcomes of the workshop. It will identify the key challenges and explore the policy options for governments in addressing the implementation gaps to ensure a sustainable and profitable aquaculture sector.

Is aquaculture production growing in Latin America and the Caribbean?

ID paper: 97

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Fisheries constitute a major productive sector in Latin America and the Caribbean. This sector generates income, provides employment, and makes a significant contribution to food security and the generation of foreign exchange. With most fishery resources fully exploited or depleted, opportunities for fishery development lie primarily in restoring depleted stocks or in developing the aquaculture sector. Increases in aquaculture production have been important economically in Latin America and the Caribbean in recent years. However, little research has been focused on aquaculture production in the region. To address this issue, we examined rates of growth of aquaculture production for all marine species (fish, crustaceans, and mollusks) and countries (33) in the region. Our results contradict the optimistic view of aquaculture as a significant food supplier in the mid and long term, as we found a declining trend in the rate of growth, both in volume and value, in recent years in all countries studied.

Aquaculture Economics/AQ02
Aquaculture development

Effect of trade and agricultural policies on fish trade and production in nigeria

ID paper: 109

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The fishery sector is important in Nigeria s development matrix. The sector not only provides employment for the citizens but also contributes more than 40% of animal protein consumed by average Nigerian. However, over the years the role of providing animal protein for the populace dwindled to the extent that fish demand outweigh fish production. In fact, Nigeria imports about 560,000 tons of fish worth 400 million U.S. dollars annually, despite the available natural and human resources to supply fish for the whole of West Africa. In order to reverse decline in fish production and curtail fish imports, Government of Nigeria put up agricultural and trade policies to boost fish production and move Nigeria toward self sufficiency in fish. In this study we examined if these policies have influenced fish production, import and export from 1961-2006 in Nigeria. We applied statistical and econometric techniques to relevant time series data generated from Central Bank of Nigeria Statistical Bulletin and Food and Agricultural Organisation Statistical Database. The results of the analyses indicate that Pre Structural Adjustment Programme (Pre SAP) policies significantly increased per capita fish production in Nigeria and similarly led to increase in fish importation. However, Structural Adjustment Programme policies significantly increased per capita fish export quantity and values. The implication of these findings is that although SAP may increase fish export in Nigeria, it may not ensure fish self-sufficiency in Nigeria. Therefore, the government needs to set in motion sustainable sector specific strategies and policies in order to fully exploit the potentials of Nigeria s fishery sector. One of these sustainable strategies is the proper harnessing of aquaculture.

Benefits from R&D and spill-overs in aquaculture: an eu-15 modelling approach

ID paper: 331

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Aquaculture is increasingly important for the future supply of fish because of steadily increasing demand while supply from fisheries is stagnating. In the EU aquaculture production has grown strongly in some countries, such as Spain and Greece, but was flat at a low level in others, such as in Germany, where national aquaculture production contributes only little to total supply of fish for food. Despite the small size of their aquaculture industries some German states have initiated sizeable aquaculture R&D-programs with the objective to foster local aquaculture industries. This study analyses economic effects of aquaculture R&D from the perspective of a country whose aquaculture industry is small in relation to the EU market and which has to consider significant R&D-spill-overs in addition to the usual impacts of R&D on producers' costs and consumers' consumption expenses. Based on fish market characteristics for EU-15-countries three scenarios are investigated using IFPRI´s Dynamic Research Evaluation for Management (DREAM) model. In the first scenario R&D-effects only take place in German aquaculture production and no spill-overs to other countries occur. The second scenario allows for spill-overs of technologies from Germany to all other EU-15-countries. Time lags for the transmission of technologies to the remaining EU-15-countries are introduced in the third scenario. DREAM computes the effects of R&D for producers and consumers: changes in quantities and prices of fish from aquaculture leads to changes in producer and consumer surplus. The results of this paper provide important implications for political decisions concerning the allocation of public funds for R&D-projects in aquaculture.

Does financing an aquaculture start-up company make commercial sense? the case of australia s clean seas tuna ltd.

ID paper: 234

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The paper presents the key features of South Australia_s Clean Seas Tuna Ltd in terms of the company_s development history as a start-up in the pioneering field of Southern Bluefin Tuna aquaculture.In March last year, it succeeded in achieving 35 days of continuous spawning and had SBT fingerlings of over 50 cm after 150 days in seawater tanks. The paper looks at the strategy adopted by the company_s majority owners, the Stehr family, in developing the technologies to successfully spawn and raise the fingerlings in the ten years since the Stehr family started upon this journey of discovery. Interestingly, their prior experience in aquaculture was limited to fattening wild caught SBT juveniles.This year_s spawning commenced in mid-January. It plans to transfer 25,000 fingerlings into offshore marine floating grow-out cages within 1.5 to 2 months. By the following year, it plans to raise 100,000 fingerlings to commercial size. By 2015, its target is to produce an equivalent tonnage as that of the whole Australian SBT aquaculture industry from its own broodstock (i.e. about 10,000 tonnes/year).The paper reviews the financial development of the company from its inception to its position today having raised nearly A$ 150 million to get to this stage of its growth. It also looks at its future capital needs in order to achieve its stated targets.A brief comparison is made with other Australian aquaculture start-ups.

Potential utilization of aquatic ecosystem through IT and TOT system for updating productivity and economic stability for fishing communities in Indian sub-continent

ID paper: 55

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For proper utilization of Tal wetland ecosystem through natural resource management and for updating production system through the integration of fish-crop diversity and its proper implications to its farmers level through modernizing adaptive technologies as well, IT system, a composite zonewise TOT programmes (use of natural resources, farm demonstrations, farmers awareness camp, farmers day and participants training programmes etc.) were adopted for upliftment of rural economy in Indian sub-tropics. Wetlands a natural gift with full of natural resources were systematically utilized at its greater diversity for inland fish production system relating to permanent (2.5 ± 1.0 m of water depth round the year), semi-permanent (flooding during rainy of 2.0 ± 1.0 - 1.5 m of water depth & drying during summer) and temporary (flooding during rainy of d 2.0 ± 1.0 - 1.5 m of water depth & drying during summer including part of winter) in nature. Attention was paid towards finding of newer types of aquaculture production innovation (fish-aquatic food crop diversity, organic aquaculture, eco-friendly balanced food habits, crop geometry & its management), which has contributed significantly in boosting up of production system to its saturated level. Through studies for characterization and realization the importance of aquaculture for fish-crop productive system than monocropping, nutritional quality and economical stability for the resource-poor farm families, demonstrations cum case studies were undertaken on fish variables [Live fishes as magur - Clarias batrachus & singi - Heteropneustes fossilis and sweet water fishes (rohu - Labeo rohita & katla - Katla katla)] along with 2 starch & protein-rich aquatic popular food crops (water chestnut - Trapa bispinosa Roxb., makhana - Euryale ferox Salisb.) integrately in the regions. Results were more encouraging and gained a substantial enough to reach its goal through the production system of different agro-zones. Fishes, immature fresh fruit kernels of water chestnut and mature seed kernels of makhana which are most popular, nutritious and remunerative, hence, were considered for cultivation in waste tal wetlands for the upliftment of socio-economics than that of present situation existing in these zones. Regarding production economics, GMR, NP and B-C ratio were also significant with the integrated system, which is being economically viable, particularly for upliftment of rural economy.

Food security through aquaculture development: lessons from Bangladesh and Malawi

ID paper: 211

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Small-scale aquaculture is fundamental to the livelihoods of many of the rural poor in Asia and Africa. There is growing evidence that in many cases the poorer people have the greater dependence on aquatic resources, particularly low-value fish and non-fish aquatic resources. However, in spite of the benefits, the potential of aquaculture for rural development and poverty alleviation is often overlooked by national authorities and international development agencies. The reasons include its often informal, small-scale nature and part-time activity. Limited availability of production, income and employment data exacerbate this underestimation. Taking examples from Bangladesh and Malawi, this paper examines the impact of aquaculture development on poverty alleviation and food security from the standpoint of its impact on employment, income and household consumption and nutrition. The analysis shows a positive impact of aquaculture development on employment, income and consumption. The paper concludes that it will pay-off if national policies in their medium to long-term plans are geared toward increasing the production of fish from aquaculture. Such policies will, however, need to concurrently address the food security and poverty questions more sharply than that has been done at present by increasing institutional and infrastructure support for diversification of production targeted to resource poor households.

How can aquaculture contribute to the poor? Evidence from brackish-water extensive polyculture in the Philippines

ID paper: 391

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Aquaculture is one of the most dynamic food-producing subsectors worldwide. In the Philippines, shrimp monoculture started in the 1980s, only to collapse less than a decade later due to disease. More recently, extensive polyculture of fish, shrimp and mud crabs has developed. The objective of this paper is to analyze the contribution of this system of brackish-water extensive polyculture to the alleviation of poverty. Often excluded from aquaculture due to high investment costs and the absence of markets for land, credit and labor, the poor are seldom able to benefit from the potential benefits of aquaculture (in terms of employment and incomes, access to food, etc.). Based on extensive empirical data gathered in the Pampanga coastal area (Central Luzon), this article highlights the economic benefits that brackish-water extensive polyculture brings to the poor by focusing on both those who are part of the aquaculture system (small farmers, pond caretakers) and on those who work at its margins (local communities surrounded by fish ponds). In a context of growing attention devoted to sustainable development on the part of the food industry, this article ultimately asks whether the peculiar production system developed in the Pampanga Coastal area and the very specific values that it retains could be channeled all the way to enlightened consumers in the North through certification and labeling schemes.

Socioeconomic impact of a gathering and distribution centre for live tilapia in veracruz, Mexico

ID paper: 437

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The overall aim of this research project is to determine the socioeconomic impact of a live tilapia gathering and distribution centre on rural and peri-urban fish farmers. The study area is established in the fringes between urban and rural areas of Veracruz City, in Mexico. Previously, both the national and regional initiatives called Tilapia System Product and Tilapia Veracruz System Product detected the need of strengthening the comercial link in the tilapia productive chain by the creation of a live tilapia gathering and distribution centre. Hypothetically, establishing live product among the consumers' preferences will not only increase their protein intake, but will improve also small-scale tilapia farmers' economy. The methodological approach will include marketing studies, a business plan, a financial analysis and pilot tests. Potentially, the main benefit of this research will be the social welfare that tilapia farmers of Veracruz will gain by determining a marketing system, specifically designed to meet their needs, while ensuring the efficiency of the comercial link within the tilapia productive chain. Furthermore, expected findings might help the industry by encouraging ethical consumerism of farm-raised tilapia while promoting local production.

Is aquaculture a sustainable source of food and income in Nigeria?

ID paper: 13

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Aquaculture is an industry regarded as being uniquely placed to reverse declining supplies from capture fisheries in many developing countries. There is a growing consensus that this industry offers potential in meeting key components of Millennium Development Goals (MDGs) around the globe. While drawing analogue from national statistical data and various studies on aquaculture production in the country for past ten years, the study assess whether the industry is sustainable enough to provide new livelihood opportunities to Nigerians. To this end, we found evidence of potential inherent in aquaculture production to enhanced national nutritional security most especially as a major player in augmenting the supply of fish protein for consumption in the country. We also found that the industry is a viable source of income for households in the country and foreign exchange earnings for the country. Likewise we observed its untapped opportunity to increase rural employment and reduce poverty. The article identified challenges impeding its development in Nigeria which can be categorized as; economic (e.g., credit, high cost of inputs), technical (e.g., lack of information on aquaculture techniques and inadequate management strategies), ecological and institutional factors (e.g., lack of capital). Another significant problem is the presence of production inefficiency that characterized this industry. In order to reposition the industry, the present study suggests policies that will enhanced technical know-how of the farmers, reduce cost of inputs and provision of needed credit as counterpart in crop subsector often enjoy. We concluded that these policies should be vigorously pursued and implemented.

Role of shrimp farming in generating employment and income: a study of small- scale shrimp farming in West Bengal, India

ID paper: 62

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In the light of the usual allegation against shrimp farming as an employment displacing activity, this paper tries to examine the role of shrimp farming in generation of employment and income for small scale shrimp farmers in West Bengal, India using primary data collected from 208 traditional and scientific shrimp farmers in West Bengal. The analysis reveals that the labour used (including family labour) for traditional and scientific shrimp farming were 101 mandays per acre and 300 mandays per acre respectively. Both the figures were more than the labour requirement for paddy cultivation in West Bengal. The finding refutes the allegation against shrimp farming as an employment displacing activity as compared paddy cultivation. A comparison of the household income of sample shrimp farmers with the rural poverty line in West Bengal revealed that shrimp farmers of all the categories (small, medium and large) were above the poverty line. However, per capita annual household income of marginal traditional shrimp farmers was quite close to the poverty line which emphasizes the need for pondering special extension facilities to these shrimp farmers. The study also shows that on the whole shrimp farming accounted for about 70% of the annual household income of the sample households. However the importance of shrimp farming was lesser in the case of shrimp farmers with lesser shrimp farm size. This indicates the quest of marginal and small shrimp farmers to diversify their source of income in order to cover the risk associated with shrimp culture. On the whole shrimp farming was proved to be an employment generating activity and had contributed significantly to the income of the sample households.

Impacts of community- based fish culture in seasonal floodplains on livelihoods in Bangladesh

ID paper: 214

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This paper examines the impact of community based fish culture in seasonal floodplains on fish production, consumption, income and food security of the participating households in Bangladesh. About 30 percent households of the three project and control floodplains were randomly selected, from whom data were collected using longitudinal surveys on a quarterly and monthly basis for the years 2007 and 2008. Findings show that fish production, income and food security of the participating households have increased due to the adoption of an equitable and inclusive multi-stakeholder approach introduced by the project. Average fish production has increased to 443 kg/ha/yr. The introduced approach generated 37% and 68% higher of fishing to household income in the project sites in the first and second year respectively than the control sites. Per capita annual household fish consumption increased from 16.5 kg to 25.1kg/person/year in the intervention site, which is 44% higher than the control sites. Project interventions reduced the vulnerability of local beneficiaries, particularly of landless and poor fishers by generating additional fishing opportunity in the flood season for up to 6 months of the year. Indirect benefits of community based fish culture include reduced conflict; improved social capital and greater cooperation in the community. Promotion of the community based fish culture in seasonal floodplains may thus be a useful tool to bring about positive changes in the overall productivity and livelihood gains for poor people in Bangladesh.

Aquaculture Economics/AQ04
Contribution of aquaculture to socioeconomic wellbeing

Seaweed farming and its contribution to sustainable livelihood in the Philippines

ID paper: 445

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The paper presents an assessment of the contribution of seaweed farming in the Philippines to small fishermen using an indicator system based on the sustainable livelihood framework. The indicator system is developed through an experts workshop in Nha Trang, Vietnam in November 2008, and one of the pilot sites is the Philippines. The indicators cover five livelihood assets: natural, physical, human, financial and social capital. The study was conducted in Calatagan, Batangas, located in the main island of the Philippines for three months (January to March 2009). The analysis showed that seaweed farming contributed significantly to the financial capital of fishing households, however, its contribution to other livelihood assets specifically on the social and human capital remain to be a major challenge. In the course of the study, it was found out that seaweed farming requires low input and hence, accessible to small fishermen with minimal financial capital, and the market, although fluctuating, is already established, which makes this enterprise a viable and sustainable livelihood. The major threat however is the environmental quality of coastal waters that is currently perceived to be threatened by emerging uses of the coastal zones, such as tourism and mariculture.

Performance of fish farms in Ghana - A stochastic frontier approach

ID paper: 12

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This study applies the single-stage modelling stochastic frontier approach to assess the performance of fish farms in Ghana. It examines technical efficiency and its determinants of 150 farms surveyed in 2007 and extend the scope of the analysis to explore interactive effects of farm specific variables on efficiency of production. Findings demonstrate that expected elasticities of mean output with respect to all input variables are positive and significant. Computed return to scale reveals that fish farms in Ghana are characterised by technology with increasing return to scale. The combined effects of operational and farm specific factors are found to influence efficiency. The study further reveals that inclusion of interaction between some exogenous variables in the inefficiency model is significant in explaining the variation in efficiency. Comparison of mean technical efficiency according to regions did not show any significant variation. Overall mean technical efficiency is estimated to be 80.8%. Key Words: Fish farms, technical efficiency, stochastic frontier, elasticity, return to scale.

Aquaculture Economics/AQ05
Aquaculture efficiency and management

Measuring technical efficiency of farmed catfish production in Southwest, Nigeria: a stochastic frontier production function approach

ID paper: 23

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Aquaculture is globally recognized as an important source of food fish for the poor who consume insufficient animal proteins. Catfish is the most popularly raised and consumed fish species in Nigeria. The differences in farmer and farm-specific characteristics across production areas may have implications for efficiency levels. The paucity of data on the aquaculture sector has however meant limited analysis. Given changes in the dynamics of the aquaculture sector, this paper investigates the degree of efficiency and factors contributing to it. Data collected from 108 farmers in Ondo and Ogun States, were used to estimate technical efficiency through stochastic frontier production model. Empirical analysis showed that there were wide variations in predicted technical efficiencies across farms ranging from 48% to 77% in Ondo State and 45% to 82% in Ogun State with means of 64% and 68% respectively. There were no significant differences in efficiency measures between the two States. The three null hypotheses tested in relation to the efficiency frontier, were rejected. The results reveal the factors influencing the extent of technical efficiency. The study concludes that opportunities exist to improve technical efficiency in the study area. Results of the analysis having implications for the aquaculture industry and for policy-makers, who rely on the supply-side in their regulatory attempt of the fishing industry, were discussed.

Technical efficiency of urban fish farming in oyo state-nigeria

ID paper: 65

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The high demand for fish and its products that cannot be met by capture fisheries and importation but by domestic production through fish farming has made Urban aquaculture to attract increasing attention for its role in feeding people and recycling wastes in many parts of Nigeria. This study made use of a cross-sectional data obtained from fish farmers in the two zones of Oyo State Agricultural Development Project (ADP) that were purposively selected because of the higher concentration of fish farms compared to other zones in the state. One hundred respondents were randomly chosen from a list of fish farms obtained from the Fisheries Department of the State Ministry of Agriculture and Natural Resources.The data collected was analysed using Data Envelopment Analysis (DEA)to obtain the overall technical efficiency which was further broken down into pure and scale efficiencies. It was observed from the findings that the mean efficiencies of urban fish farms were estimated as 0.92; 0.97; and 0.95 for technical efficiency with constant and variable returns to scale and scale efficiency respectively. A weak but significant correlation was observed between the efficiency indexes obtained using the two scale assumption. Based on our findings, sampled fish farmers could increase their output through better use of available resources. In addition, a second stage Tobit regression shows the variation is also related to farm-specific attributes such as the farmers experience, the farm manager s gender, age, and education. Based on the empirical findings, policy implications and development strategies for improving efficiency of urban fish farms are briefly discussed

Aquaculture Economics/AQ05
Aquaculture efficiency and management

Performance of the Malaysian states in aquaculture production

ID paper: 82

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Aquaculture activity as an enterprise is fast spreading in Malaysia partly due to the government initiation and support as reflected in the 9th Malaysia Plan. In addition to the support of national policy the availability and viability of new technologies are being analyzed and introduced to the industry. New species of fresh water and brackish water prawns and fishes are studied to make this industry a successfully one across individuals and private firms. It is targeted to significantly reduce the incidence of poverty among the rural people. The impact, however, is expected to vary between the culturists and states because of the variation in the adoption practices, management ability, availability of credit and fingerlings and most urgent is the variation in size of operating units devoted to the enterprise. The objective of this paper is to identify states that performed well above the others in terms of productivity and technical efficiency. Ability to locate the best firms enables researchers to discover the best enterprise practices that can be used as the model enterprise. Dissemination of findings to the less progressive operating units is also urgent for policy recommendations. Data envelopment analysis (DEA) will be used to estimate technical efficiency, pure technical efficiency and scale efficiency in aquaculture production.

Optimal allocation of water resources in sri lanka: the case of reservoir-based rice farming and culture-based fisheries development

ID paper: 308

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Reservoirs provide the main source of water for rice farming and culture-based fisheries (CBF) production in Sri Lanka as well as in many other South-east Asian countries. In addition to rice farming village reservoir water is also used for CBF production. Reservoir water is used efficiently only when it is used to increase output per unit, minimize losses of less efficient uses and re-allocate water to high priority sectors. This paper is intended to analysis the inter-sectoral (e.g. water use between rice farming and CBF)and intra-sectoral (e.g. between rice farmers) static optimal reservoir water re-allocation issues. In this study, we develop production frontiers for rice farming and CBF production to examine efficient water allocation in reservoir-based agricultural production. The marginal value of water in each sector will be derived and used to determine an optimal allocation. By examining the technical efficiency of production it is also possible to examine the potential gains in reservoir water use by removing inefficient production. The hypotheses which are highlighted in the study will be tested using a total of 646 rice and CBF farmers in Sri Lanka. Regional data will be used to derive more aggregated models. The research will help bridge the knowledge gap of the question: how efficient is the current co-operative arrangement over a market based system in allocating water.The question focus in the research also will have policy relevance beyond the case study (and country) examined.

Economic efficiency of aquaculture production in Edo state, Nigeria

ID paper: 442

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The study examines economic efficiency of aquaculture production in Edo State. The data for the analysis were obtained from the fish farmers through the administration of structured questionnaire, using multistage sampling technique and leading to the selection of 100 respondents. Data were analyzed, using stochastic frontier production function as in Frontier Version 4.1, applying the maximum likelihood estimation technique. The result of the analysis shows that the fish farmers were operating at the positive increasing returns to scale (RTS = 2.055). The study shows that if the amount of fingerlings, hired labour, family labour, quantity of feeds and annual cost of materials were increased by 100% in aquaculture production, total fish output in the aquaculture farms will increase by 40.2%, 136.9%, 6.5%, 26.5%, and 7.6% for each of the increase in the input respectively.. This establishes the fact that these resources were under utilized in aquaculture production in Edo State. The mean technical efficiency estimated at about 63% is suggesting that the aquaculture farmers were only 63% efficient in the use of the combination of their inputs. The study concludes that aquaculture production and its efficiency can be increased in Edo State in Nigeria by increasing the stocking density, increase access to credit and extension services. If these are done, the contribution of aquaculture fishery to total fish supply in Nigeria that was about 5% in 1991, and then increased to 12% in 2007, can increase faster to about 40% in the nearest future.

Bioeconomic analysis of ration size in Nile tilapia feeding: an example of Yucatan, Mexico

ID paper: 127

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Nile tilapia has been cultivated in intensive systems in Yucatan, Mexico, during the first years of this century. Nevertheless, its adoption faces technical (related to the use of commercial feed) and marketing problems (fixed price of $1.95/Kg), which are analyzed in this paper. To do this, a bioeconomic model of Nile tilapia cultivation was estimated for four different ration sizes: 50%, 80% and 100% of the ration recommended by feed suppliers, and the satiety ration. The rations tested were standardized using a rank of 0 to 1.0 (0 = starvation and 1.0 = satiety). A von Bertalanffy-type equation was selected for the fish growth, which includes the effect of the ration size. The model was simulated for different scenarios, including six fixed harvest sizes and two market conditions (fixed and size-dependent price). Independently to price schedules, the maximum profit was obtained with standardized ration sizes of 0.61, 0.61, 0.67, 0.71, 75 and 0.76 for harvest sizes of 200, 250, 300, 350, 400 and 450 g, respectively. However, the highest profits were achieved with a harvest size of 400 g for the case of size-dependent price, which is reduced to 300 g for a fixed fish price. All optimal ration sizes were located with values below ration recommended by feed suppliers (0.84). The application of these results could increase producer income and improve input efficiency.

Aquaculture Economics/AQ06
Aquaculture efficiency and management

Optimal harvesting time in aquaculture assuming nonlinear size-heterogeneous growth

ID paper: 263

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This study explores the optimal harvesting time in a size-heterogeneous population dynamics. The model includes the effect of population density in both the mortality rate and individual growth. An application to specific conditions of shrimp culture in Mexico is presented. The optimal harvesting rule is numerically found for different economic and productive scenarios. Parallel results are also obtained under the hypothesis of homogeneous population growth, which has been traditionally considered in the economic literature. In general, the discounted net revenue of the firm is underestimated if the size-heterogeneity phenomenon is not taken into account, while the calculated harvesting time shortens the predictions based on the homogeneous growth hypothesis. These results reveal that optimal management rules are significantly mistaken if the size-heterogeneity phenomenon is not taken into account.

A comparative analysis of financial and development impacts of two hatchery approaches to promote Nile tilapia in Northwest Bangladesh

ID paper: 447

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Adoption of aquaculture, particularly among the rural poor, requires timely and quality seed at the farmer level. In areas of Northwest Bangladesh, the region considered most marginalised for food production, carp polyculture has been improved through the introduction of Nile tilapia, but constrained by under-developed seed supply. In order to meet such demand at the household level, a ricefield- based fish seed production (RBFSP) was compared to a conventional centralised hatchery approach. Decentralised RBFSP was promoted in northwest Bangladesh through research and development initiatives during 1993 to 2005. This study attempted to assess the cost-effectiveness of RBFSP at the farmer level in terms of project based investment and broader development impacts. Results revealed that decentralised tilapia seed production could be promoted through Farmer Field Schools in a cost-effective way compared to a monosex tilapia hatchery. A considerable level of net present value (NPV) and benefit cost ratio (BCR) were obtained from RBFSP at the farmer level. Discounted BCR for RBFSP was found to be 3 times higher than hatchery based monosex tilapia seed production. Cost-effectiveness in terms of multiplier development impacts with respect to ramification of secondary adopters and, income of fry traders and foodfish producers added a large monetary value to decentralised RBFSP.

Determinants of land leasing decisions for shrimp farming: a case study from of small-holders shrimp farming in india

ID paper: 51

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Using primary data collected from 208 shrimp farming households and 69 households leasing-out land for shrimp farming, this paper explores the demographic and economic factors influencing the land leasing decisions for traditional and scientific shrimp farming in West Bengal, India, applying Tobit Model. The results indicate that size of household s land holding is positively related with the extent of land leased-in for traditional shrimp farming whereas for scientific shrimp farming the association was found to be negative. This signifies that land leasing market does not facilitate the households having lesser landholding to lease-in land for shrimp culture in the case of traditional shrimp farming whereas in the case of scientific shrimp farming it does facilitate such households. In the case of traditional shrimp farming household s association with other fisheries related activities was also found to have positive influence on their leasing-in decisions . On the supply side, variables like number of adult male members, household s association with fisheries related activities and non-farm assets were found to have positive, negative and positive association respectively with the extent of land leased-out for traditional shrimp farming. The analysis also exhibits that the age of the household head has negative relationship with the extent of land leased-out by them both in the case of traditional and scientific shrimp farming. This signifies that existing institutional arrangements in shrimp farming of West Bengal are not considerably successful to motivate young rural people to undertake shrimp farming on their own instead of leasing-out land for shrimp culture and aquaculture policies should address this aspect.

The governance of shrimp production and trade: case study on shrimp farming and trade in Tarakan, East Kalimantan, Indonesia

ID paper: 120

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As part of the RESCOPAR (Rebuilding resilience of coastal populations and aquatic resources) program, since mid-2008 I have been doing fieldwork for my doctoral thesis entitled: Towards improved coastal governance in East Kalimantan, Indonesia: lessons from marine conservation and shrimp farming . The RESCOPAR program focuses on multi scale interaction between the underlying ecological, social and political processes and possible threats to the resilience of mangrove forest coastal ecosystems. During the decentralization period in Indonesia (1998-2005), shrimp pond development and shrimp production expended significantly. There are also indications that this expansion has had significant environmental impact, especially on the mangrove forest. This extensification or expansion process has been facilitated by the national government through various support programs. Another important factor affecting the shrimp production and trade is the rising demand in EU and US for sustainable marine products, especially shrimp production and related products. The rising environmental awareness in Europe and US about the environmental impact of shrimp ponds in producer countries likely to put pressure on shrimp producing countries such as Indonesia. If the calls for shrimp certification are implemented, this will also be an important factor influencing broader marine and coastal resource policies in Indonesia. These above processes are illustrated with case study material from Tarakan, East Kalimantan, Indonesia. Tarakan is the main shrimp industry area in East Kalimantan. The sector as a whole, including the fisheries and aquaculture industry, is growing fast . One reason for the importance of Tarakan in Indonesia is the fact that Out of the total of 13 cold storage plants in the province of East Kalimantan eight are located in Tarakan,. The majority of shrimp farmers supply cold storage plants in Tarakan, a process which \also involves middle men and itinerant traders travelling between shrimp pond locations in Berau, Bulungan and Tanah Tidung Districts. Secondly, the tiger shrimp species only exists in Asia, and the greatest concentrations are to be found in Indonesia, particularly Tarakan and Samarinda . This paper explores the actors involved in the governance of shrimp production and trade in Tarakan. The purpose of the study is to understand the interdependencies and the strategies of actors involved in the shrimp production and trade (particularly in relation to environmental demands from buyer markets) and the implication this has for coastal resource governance. This goal will be achieved by identifying and analyzing stakeholder roles, practices, and relations in order to map out the actor networks, and understand their involvement and objectives.

Optimal farm size for the production of the mediterranean mussel (mytilus galloprovincialis) in Greece

ID paper: 253

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The profitability of the Mediterranean mussel (Mytilus galloprovincialis) farming depends on a combination of factors including natural productivity, technical practices, production costs and product pricing. In an effort to analyse the financial risks of the mussel farming in Greece, we examined the profitability of the different farm sizes (1 to 4 ha) under the present situation of the local market and the modern production practices. Assuming that a farm works at a reasonable 80 % of its annual capacity and uses the widely accepted long-line technique, it was demonstrated that a farm size less than 2 ha is not viable economically. Moreover, the cost of the new establishments and the modernization of the existing ones is affordable only if larger enterprise structures are adopted. Consequently, the past EU and/or public support (up to 45% of the total cost of the fixed assets) has been critical for the development of the industry. Taking in account that the majority of the Greek mussel farms are rather small (1-2 ha), we concluded that for financial sustainability the sector needs to be restructured and be organised in larger schemes, such as those of producers organisations or co-operatives, in order to benefit from scale economics and attract better funding.

Aquaculture Economics/AQ07
Aquaculture structures and management

Impact of cultural practices on the individual and collective economic performances in shellfish farming: the case of oyster farming in Baie des Veys

ID paper: 349

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The access regulation within the shellfish farming sector in France is based on a co-management system relying on both a national legislation, defining the general access conditions to maritime public grounds, and regional regulation systems, named Regional Structural Schemes . The latter specify the farming rules in cooperation with the administration, scientific and professional representatives. This regulation system, which aims at managing the common primary resources at the scale of a shellfish farming basin, is under review in the Baie des Veys, on the Normandy coastline. In this context, biological modelling is used to assess the carrying capacity of the bay and to provide tools for modifying the"RSS" in a more sustainable way. Another objective of the study is also to shift to bio-economic modelling, implying for the model to take into account extra technical and economical parameters. A specific survey has therefore been carried out for collecting detailed information on the cultural practices of the oyster farming companies, and for analysing the links with their structural characteristics and performance indicators, in terms of productivity and output. This article reviews the context of oyster farming in the Baie des Veys from environmental, socio-economical and institutional points of view. After the presentation of the methodology used for the survey, its results are analysed and summed up, leading to the identification of the main farming technical profiles . At this stage of the study, only theoretical developments on modelling are considered and outlooks in terms of collective management measures are discussed. Key words: aquaculture economics, oyster farming, cultural practices, common resource management

U.S. Catfish farm supply under uncertainties

ID paper: 20

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The U.S. catfish industry has been declining recently due to foreign competitions and rises in production cost. The current challenges require economic impact analysis of cost rising on the industry. However, knowledge on the U.S. catfish farm supply is limited and inconsistent. The present study use both static normalized profit function approach and dynamic Nerlove adaptive expectation approaches to analyze the U.S. catfish farm supply. Empirical estimations give short-run supply elasticity of 0.26 in static approach and 0.28 in dynamic approach. Long-run supply elasticities are different between the two approaches, 0.8 in static profit function and 2.1 in dynamic adaptive expectation. Technological improvement contributes to catfish supply expansion and is attributed for only 8.5% out of 72.7% of farm supply increase between 1988 and 2008. The U.S. catfish industry is in the stage of decreasing return to scale, one percent increase in all inputs causes farm output to increase only 0.42 percent. In the short-run, catfish producers adjust production yield in response to price incentives. In the long-run, production acre is more responsive. The variation of profitability negatively affects farm supply. Farm risks are mainly from non-price factors. Catfish farm s risk is decreasing over time, and producers respond less to incentives in the presence of risks, supply elasticities are 0.23 with consideration of risk, and 0.59 without risk consideration.

Faustmann rotation and aquaculture in the presence of an epidemic risk

ID paper: 126

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For the management of natural resources, the first question that arises is : what is the optimal duration of cycle production. This is the case both in forestry, aquaculture, production of renewable resources. In the case where a calculation method to predict earnings for various terms of the cycle is available, Faustmann [2] proposed a formalism based on the expected discounted yield. Many authors have successively improved or reformulated the method, Ohlin [7], Pearse [8]. Clark [1] has applied this method to natural resources, in the absence of risk of destructive events. The risk of destruction has been introduced to forest stands by Martell [6] and Routledge [10] in discrete time. Thereafter, Reed [9] has studied the optimal forest rotation in continuous time with the risk of fire. Most of the work on Faustmann rotation and in particular the study of Reed [9] are developed in the context of forestry but are not specific to forestry and can be ap- plied to the production of renewable resources. In the context of random prices in aquaculture Guttormsen [3] studies a method based on dynamic programming. For the absence of risk of destructive events, epidemic events all the production cycles are carried out to the same term. When the risk of destructive event exists and is taken into account, the authors cited above assume that the operator systematically decides to interrupt the current cycle and begin a new cycle. This is fully justified in the case of severe epidemic. In the case of an epidemic of limited impact on mortality, to the first question about the optimal term a second question is added : should we interrupt the current cycle and begin a new cycle or is it better to continue the current cycle ? If there are alternatives, what is the criterion to choose ? To fulfill this goal in a framework of not too restrictive assumptions, first we define a criterion for choice and secondly we use a dynamic model population that allows us to follow the evolution of individuals of the system. We consider a simplified model of averaged individual type, inspired by the models of Hannesson [4] and Heaps [5], to facilitate the presentation of the proposed method and to focus the analysis on the influence of an epidemic risk. The expected discounted yield is obtained via the resolution of a quasi-linear integral equation. For specific decisions and thus specific criteria, we study two particular cases. In the first case, the operator systematically interrupts the cycle in case of a destructive event, we generalize the results obtained by Reed [9] under less restrictive assumptions. We show that the results obtained in [9] are valid under the assumption that the operator does not harvest during the production cycle and that the cleaning costs in the case of epidemic event be fixed. The proposed method takes into account intermediate harvesting and cleaning costs depending on the severity of epidemic event. In the second case, the operator continues the cycle even in case of epidemic events (which makes sense if the epidemic is minor) and we deduce the corresponding expected discounted yield. Once the criterion set, in the general case for a test choice based on the number of individuals we show the existence of a unique solution to the integral equation and we provide a numerical algorithm to solve it. Finally we show that the proposed formalism allows to integrate in a single optimization problem, the two levels of decision-making : the tactic level, with regard to harvesting and the strategic level in case of epidemic events with regard to the choice between two alternatives : to continue or to interrupt the cycle.

Economic modelling of a large-scale offshore aquaculture farming facility growing yellowtail kingfish in Western Australia suggests such a facility makes commercial sense

ID paper: 235

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Aquaculture investments in virgin situations are subject to a large number of variables and range in values. This is even more so when considering investments in open ocean aquaculture. The paper presents the key factors and results obtained for a proposed large-scale open ocean aquaculture development in Western Australia with an annual throughput of 2,000 tonnes per year of yellowtail kingfish (Seriola lalandi). Given the high level of intrinsic risks, potential investors are considered to be unlikely to accept a rate of return below 25%. The model uses Montecarlo simulation analysis to determine the project s risk profile and sensitivity to a range of different variables. The results indicate that the project is economic in the base case over a 10 year life with the fish being harvested at 3 kg after a rapid twelve month grow-out period resulting from the higher sea water temperatures available in WA with a farm-gate price of A$ 8.75/kg. The main risks measured in order of importance are as follows: " Sales price " Feed costs " Capital costs " Farm labour costs and " Processing cost. The analysis shows that economies of scale are highly significant. The paper also considers the appropriate type and level of risk for the Western Australian Government to take on in developing an offshore aquaculture policy framework.

Aquaculture Economics/AQ08
Aquaculture & risk

Risk perceptions and risk management strategies of the greek mussel farmers

ID paper: 259

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Mussel farming as an aquaculture activity based on the natural primary productivity, faces risks similar to those of the agriculture sector. Consequently, much theoretical risk research has been applied to aquaculture as in agriculture, livestock, forestry, conservation and its management. Nevertheless, limited studies have so far focused on risk perceptions strategies of the aquaculturists. This study was conducted in the context of Mediterranean mussel farming risk assessment in order to explore the farmers perceptions of risk and risk management, to examine relationships between farm and farmer characteristics, and highlight the prevailing risk perceptions and strategies. The data were collected through a sampling survey of the Greek mussel farmers based on personal questionnaire-interviews. Results show that the ex-farm price of the mussels were perceived to be the major source of risk while the financial/credit reserves were the most preferred risk management strategy. Farmers seem to resort to such practices as the activity is characterised by negligible banking support, production unpredictability, marginal profitability and low turnover, all of these rendering it a high risk activity for the financial institutions. Finally, the farmers attitudes and comments on loss compensations bring up the need to develop a more effective and versatile insurance system.

The limits of risks hedging in aquaculture: The case of shellfish farming in France.

ID paper: 196

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Shellfish farmers make their production decisions in an environment characterized by multiple uncertainty. As shellfish farming is done in an open area, producers face a large number of risks: e.g. biological, environmental, pollution or climatic risks. Historically, this sector has been affected by several crisis; the last ones were the unexpected mortality of spat in 2008 and 2009. Insurance is one important potential mechanism for managing this kind of risks (e.g. crop insurance in agriculture), but shellfish farming had limited insurance availability in France. The purpose of this article is first to determine specific risks of this segment of agriculture. We then present the existing hedging mechanisms, from self-protection / self-insurance measures to the possible intervention of the Fishery European Funds. We analyze the limits of such instruments and we try to explain why efficient protection is not available for this sector. Main reasons of such a lack are: High level of ambiguity in risks definition, individual correlation and the high degree of specialization of a small sector, what limits the possibility of risk pooling.

Aquaculture Economics/AQ09
Aquaculture & risk

Estimating the economic cost of viral salmonid disease in UK aquaculture

ID paper: 361

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The aquaculture industry in the UK has experienced substantial growth in the past two decades. The productivity and competitiveness of the sector to a great extent depends on the favourable health status that the sector enjoys relative to other major salmon producing countries in Europe. Currently the UK is subject to both a strict domestic disease surveillance and EU disease protection programmes that serve to minimise the spread of viral fish diseases. However the intensive commercial aquaculture production and the consequent interactions of salmonid aquaculture with wildlife habitats are likely to result in higher disease risks. Aquatic viral diseases risks present a potential danger that could have adverse economic effect on the aquaculture industry. In this paper, the economic benefits of viral disease control are estimated and the approaches for efficient resource use in disease control to maximise social welfare are discussed. The benefits of the virus prevention program were measured as changes in consumer and producer surpluses. Overall, the analysis indicates that viable economic criterion is an essential in fish disease control measures to ensure resources are best targeted to their efficient use use.

Risk assessment of the mediterranean seabass and seabream industry in greece: a stochastic simulation approach based on insurance claims

ID paper: 375

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The Mediterranean finfish aquaculture is strongly represented from the successful industrial development of the mass production of the Mediterranean seabass (Dicentrarchus labrax) and seabream (Spaurus aurata), with Greece as the major producer country, contributing with approximately 57% of the global farmed production of both species. Despite the difficulty to obtain information from the private and public sector about the aquaculture insurance claims, the analysis of insurance data is necessary to develop a risk management strategy of the industry. The aim of the present work is to identify the major risks affecting the seabass/seabream aquaculture by examining qualitative and quantitative insurance claims from the early developmental stage (mid-80s) up to the maturation of the Greek sector (2000). A risk assessment based on scenario quantification and Monte Carlo Simulation with the ZHA WORKS 4.2 QUANT software is used to reveal percentile statistics of 1 Year/Worst out of x Years aggregate loss and thus to "harden" the basis for decision taking. The use of the past insurance experience provides forecasting trends for risk avoidance in the future and contributes to a strategy development for the sustainability of the sector .

Economic costs of shrimp culture in coastal bangladesh

ID paper: 46

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Inspired by the export boom developing countries got involved in multiple export earning activities. However shrimp exports have become quite lucrative activities for many developing countries including Bangladesh. Shrimp occupies a good chunk of our export income. In calculating the return from shrimp exports the usual practice is the nominal monetary contribution recording ignoring the social and environmental externalities and other costs. This paper considers a case of a costal district in the southern part of Bangladesh adjacent to the World Heritage Site, Sundarban, where shrimp culture activities are the most popular economic activities of the people. It considers the social and environmental impacts of this practice and try to calculate the net contribution using total economic valuation technique. The primary inputs are survey of two villages in Khulna district. It has been revealed that the environmental costs are quite heavy in terms of biodiversity loss, land pattern change and salinity. Suggestions include incorporation of such impacts before giving institutional financial supports in different form.

Aquaculture Economics/AQ10
Aquaculture & environment

Approach to co-construction of sustainable development indicators in aquaculture

ID paper: 187

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It cannot be said that aquaculture has ignored sustainable development (SD), judging by the number of standards, guides and indicators devoted to it, produced mainly under the aegis of international organisations such as FAO, The European Union and some NGOs. However, these continue to be perceived in large measure as constraints rather than as shared objectives by actors. Faced with this situation, which is not specific to aquaculture but on the contrary quite general regardless of sector, context or scale, the authors seek to propose a generic approach that through a collective process, i.e. a co-construction, promotes the implementation and appropriation of SD. What makes this approach original is not only the participatory nature of the construction, but also the regional nature of the approach which includes both aquaculture systems and their host area. It is based on a selection process that nests principles, criteria and linking indicators to the actors issues and representations, encourages their appropriation of both SD and the indicators produced. This approach is the fruit of fieldworks undertaken by a group of French researchers in partnership with teams of scientists and actors in France, in Europe and in Southern countries (Cameroon, Indonesia and Philippines). Aquaculture systems, representative of a broad range of farming systems and governance mechanisms, were studied. Designed in a form of an instruction manual that is as flexible as possible, the approach alternates various sequences in order to modulate the range and the involvement of stakeholders and to emphasise the collective learning process.

An ecological-economic simulation model of genetic interaction between farmed and wild salmon

ID paper: 238

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The paper is the first attempt to explore the ecological and economic impacts of genetic interaction between farmed and wild salmon over generations. An age- and stage-structured bioeconomic model is developed. The biological part of the model includes age-specific life history traits such as survival rate, fecundity, spawning success for both wild and farmed salmon and their hybrids, while the economic part takes account of market and non-market values of fish stock. The model is constructed based on the Atlantic salmon fishery and salmon farming in Norway. The discounted profits are estimated given the current fishing practice over 50 years. The sensitivity analysis is also performed. It is expected that wild salmon stock will be gradually replaced with hybrid ones, while the total discounted profit will decline, but not significantly. The analysis will provide some new insights for designing effective management strategies to protect wild salmon stocks from genetic intrusion of farmed escapees.

Aquaculture Economics/AQ10
Aquaculture & environment

Shrimp production costs and returns in bangladesh: a step towards evaluation of environmental impacts

ID paper: 288

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The economy of Bangladesh has benefited enormously from the rapid development of the aquaculture production, in particular from shrimp cultivation. In 2007-08 Bangladesh earned US$ 445.41 million from shrimp export, which is about 4.25% of the value of total national export. There are over 600,000 people employed directly in shrimp aquaculture who support approximately 3.5 million dependents. However, these economic benefits are paralleled with substantial environmental, natural resource and health effects that can be attributed to shrimp farming. These include: salinisation of adjacent land that compromises rice growing; reduced drinking water quality; loss of wild fish stocks; and serious human health threats due to the spread of waterborne contagious diseases. The tradeoffs between the economic benefits and these negative impacts from shrimp farming need to be examined if there are ambitions for sustainable development of the industry. The ultimate aim of our research program is to identify those types of shrimp enterprises that have large economic returns but modest environmental, natural resource and health impacts, so that they can serve as a model for sustainable development. In this paper we present the findings on the economic returns, the first component of the above aim. While previous published work has reported findings that apply to Bangladeshi shrimp farming in general, we provide updated estimates of costs and returns for shrimp operations where we distinguish by several important criteria, such as: species of shrimp, management systems (extensive and intensive), farm size, and location (shrimp growing districts).

Technical efficiency in danish fresh water trout farms: taking pollution into account

ID paper: 448

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Production in the aquaculture sector is often associated with pollution and as being harmful to the environment. Trying to change that reputation and stimulate growth, a new more environmental friendly method of production has been developed and introduced in Danish fresh water trout farms. The purpose of this paper is to analyze whether the new more environmental friendly farms in Denmark are as technical efficient as traditional farms taking into account the socio-economic cost of pollution. Earlier results have shown that the new environmental friendly production method is just as technical efficient as the one used in traditional farms if pollution is not taken into account. In this paper, pollution is taken into account as an input in an input oriented Data Envelopment Analysis (DEA) model, which is used to estimate technical efficiency. A Tobit regression model is used in a second stage analysis. The policy implications are discussed in relation to ensure that the best and most environmental friendly producers are the ones producing. The option of supporting a shift in favor of the best environmental friendly producers, through changing the existing regulation from input based feed quotas to output based nitrogen quotas are examined. The results show that production can be increased without raising the existing level of pollution, or pollution could be reduced if production remains at the same level as today, without reducing technical efficiency.

Economic tools for bycatch reduction: theory and applications

A Bycatch reduction (Short title)

What are we protecting? the side-effects of spatial closures as a tool to mitigate fisheries bycatch

ID paper: 508

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In the quest to limit the bycatch of non-target species, marine protected areas (MPAs) have been frequently utilized. MPAs are popular with ecologists and fishery managers because of their relative ease of administration, habitat protection benefits, and the widespread acceptance of MPAs as an instrument of choice for the ecosystem based management of fisheries. Despite these merits, we argue that MPAs may have significant limitations as bycatch-mitigation tools. First, closures displace fishermen from favored fishing grounds, potentially reducing the productivity of fishing effort and increasing the costs of fishing. Second, by reducing fishermen s spatial choice set, closures can create significant spillovers by increasing pressure on other bycatch species. To provide empirical context for this analysis, we examine the closure of grounds in the Bering Sea flatfish trawl fishery for the protection of red king crab. We utilize detailed spatial data on fishing effort and catch before and after the closure to estimate zero-inflated negative binomial models of king crab and halibut bycatch. We demonstrate that while the MPAs have been effective in reducing crab bycatch, they also displaced fishermen to grounds with an increased density of an alternative bycatch species halibut. By utilizing novel simulation techniques from pre- and post-closure data, we demonstrate how MPAs are not cost-effective and how a policy that allows fishing over the entire grounds while providing a disincentive for both crab and halibut bycatch (as in a multispecies individual quota system) can achieve the multispecies bycatch conservation targets adopted by managers while increasing fishery profits.

Bycatch reduction/ ID 93
Bycatch reduction

The design of hybrid individual incentive mechanisms for bycatch reduction

ID paper: 510

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After salmon bycatch levels reached record levels in 2006 and 2007 in the Bering Sea pollock fishery, the North Pacific Fishery Management Council (NPFMC) began consideration of a hard cap that would close the fishery if it were reached. The NPFMC asked for input from economists at the National Marine Fisheries Service (NMFS) on individual bycatch accountability mechanisms, including individual salmon bycatch quotas and fees. Because bycatch and salmon abundance are partially correlated, the optimal method to reduce bycatch will both prevent an excessive level of bycatch and protect salmon at periods of lower bycatch encounters that are present at times when stocks are weak and protection most important. Because NMFS was legally unable to impose fees for the secondary purpose of protecting salmon at low abundances, the NPFMC presented industry with a choice: a fixed hard cap of 47,591 salmon or a hard-cap of 68,382 salmon with an industry-operated individual-incentive program that would provide at least as much protection as the hard cap. Here we feature characteristics of programs that will protect salmon during high and low encounter periods and the specifics of programs proposed by industry. We discuss the efficiency and effectiveness of these programs and discuss the importance of having individual bycatch quota under a hard cap which could otherwise erode benefits in the rationalized fishery. The NPFMC passed a plan amendment that will go in place in 2011 that will allow for the implementation of a hybrid incentive system, potentially protecting salmon at all abundance levels.

From mobile closures to individual incentives: Chinook salmon bycatch reduction efforts in the Bering Sea pollock fishery

ID paper: 511

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Bycatch is repeatedly noted as a primary problem of fisheries management and as the foremost negative impact of commercial fishing. In the Bering Sea pollock fishery, salmon bycatch reduction measures have included gear modifications but have principally consisted of area closures. Bycatch levels of chum and Chinook salmon have risen substantially since the beginning of the decade and significant areas of the pollock fishery have been closed at some points between 2002 and the present. These closures have consisted of both large long-term Salmon Savings Area closures and short-term voluntary rolling hotspot (VRHS) closures. More recently, the North Pacific Fishery Management Council has acted to impose a hard cap on the pollock fishery which would close the fishery if it were reached. In this paper, we consider the effectiveness of different management actions taken and under consideration to manage salmon bycatch. We examine the effectiveness of spatial closures designed to reduce salmon bycatch in the Bering Sea pollock fishery. We compare the relative effectiveness of spatial management measures that have been implemented with tradable salmon bycatch programs that will be implemented in 2011.

Incentive systems for reducing bycatch in the alaska pollock/salmon fishery

ID paper: 512

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The bycatch problem has remained troubling and persistent, even in fisheries that have rationalized their target fisheries. The Alaskan Pollock fishery is an example of a fishery struggling to contain the bycatch of salmon in spite of a transformation of incentives associated with a harvester coop system in the target fishery. Recently the Council asked Alaska industry participants to devise their own incentive systems for reducing salmon bycatch, and the industry responded with two very imaginative schemes. One scheme proposes setting up a tournament that reward fishermen with low ex post relative bycatch rates. The other scheme is a tradable bycatch system with a quota and with carryover from year to year. Both schemes are ingenious, but complicated, and their ultimate impacts are difficult to forecast a priori. This paper develops simple models of each alternative in order to forecast and compare bycatch and other performance measures of outcomes. We explore how different design alternatives influence bycatch rates and efficiency under various abundance scenarios for bycatch. We speculate on how various restrictions imposed by the Council on the design influence the attainment of bycatch reduction objectives.

Markets, pooling and insurance for managing incidental catch in fisheries

ID paper: 513

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Bycatch is a nearly universal problem for fisheries, and it is becoming increasingly common to place strict limits on allowable bycatch, either on individuals or as a cap on an industry sector s bycatch. Individual bycatch quotas strengthen individual incentives to avoid bycatch and may reduce the likelihood that the bycatch cap will limit target species catch. However, in cases where bycatch is highly uncertain and highly variable, individual quotas and markets may not function effectively and efficiently. In some cases, such as sea turtles, marine mammals and rare seabird bycatch, the allowable take may be less than one take per permit holder making it difficult to allocate quota to individuals. There are a number of reasons, theoretical and empirical, to believe that a transferable quota market may not function effectively in cases like this, including very thin markets and very limited information with which to assess quota value for trading. I focus here on the implications of stochasticity and uncertainty of incidental catch for valuing quota in an individual quota system that includes both target species and incidentally caught species. I evaluate the degree to which quota markets reduces individual risk relative to simply having a non-transferable individual bycatch quota and also explore how pooling approaches and possibly market insurance can be used to increase value and reduce risk for fishermen.

Special session

Beyond anecdote and advocacy: Assessing the impact of co-management as an instrument for fisheries governance

Co-management (Short title)

Co-management interventions in developing countries: findings from a global meta-analysis

ID paper: 493

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Considerable financial and political investments in fisheries co-management in the past 20 years have disseminated the concept across the developed and developing world. Co-management is now established as a mainstream approach to small-scale fisheries governance. This paper reports on a meta-analysis to assess the overall impact of fisheries co-management in the developing world. A comprehensive review of co-management studies reveals a lack of ex post impact assessments despite the large number of co-management applications in developing countries. To deal with the diversity of indicators measured and the different ways that data are collected, analysed and reported in existing assessments, we applied a coding system to capture change over time. We grouped all findings into one of the following five categories: significantly positive, positive, no change, negative, significantly negative. The findings of the meta-analysis suggest that, overall, co-management delivers some benefits to end-users through improvements in key process and outcome indicators. However, we discuss a number of factors that could have biased our results. Limitations in the existing studies and the lack of comparative and ex post impact assessment data reiterates calls in other fields for more comprehensive frameworks and systematic approaches for understanding and evaluating collective action.

Impact of fisheries co-management on livelihoods and conservation in Southern Africa

ID paper: 518

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The last fifteen years have seen increased reference to and adoption of co-management in fisheries in Southern Africa, usually as a conditionality for (national or international) development aid in the sector. Co-management is supposed to improve the proficiency and efficiency of fisheries management through decentralization and democratization of decision-making, which would increase user accountability for management decisions. In the end this should result in a win-win situation sustainable fisheries and sustainable fisheries based livelihoods. What has, however, been the real impact of co-management on sustainable exploitation practices and on livelihoods of fishing communities in Southern Africa? This paper attempts to answer this question using empirical cases of both inland and marine fisheries co-management in southern Africa. The analysis revealed that, contrary to the initial hopes, the current outcomes of these co-management reforms appear rather mixed, both for the resources and their end-users. Differences in perceptions of what the issues were among the three main players - fishers, government and donors - resulted in varying and sometimes disappointing results. Through specific examples from Malawi, South Africa and other parts of the region, we discuss the potential reasons for these outcomes and suggest ways to improve policies on fisheries co-management.

Measuring transaction costs of fisheries co-management

ID paper: 140

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Fisheries co-management as an alternative to centralized command and control fisheries management is often suggested as a solution to the problems of fisheries resource use conflicts and overexploitation. Various researchers have talked of the importance of studying the role of transaction costs between different institutional arrangements for managing fisheries resources. This article provides an analysis of measurements of the transaction costs under a fisheries co-management system in the Philippines and Bangladesh. The results obtained indicate that the difference in the total costs of fisheries management between centralized government management and co-management is not that significant. However, the downstream or implementation costs are lower for a co-managed approach. This is because the cost of monitoring and enforcement are lower, and there is higher compliance with rules and regulations. This is important from a policy perspective as the implementation costs are the costs encountered on a perpetual basis as the management institutions are implemented. This could result in an overall lower cost of managing the fisheries resources for the society.

Co-management/ ID 75
Co-management

A quantitative analysis of co-management success across the Indo-Pacific

ID paper: 516

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Throughout the Indo-Pacific region, communities are increasingly empowered with the ability and responsibility of working with national governments to make decisions about their marine resources. In some instances, co-management arrangements have been successful at conserving marine resources by developing locally appropriate rules to limit overexploitation. These examples have often prompted widespread replication by governments, conservation groups, and sometimes communities themselves. However, this replication is often done without a fundamental understanding of why co-management may be successful under some conditions but unsuccessful under others. Thus a question of crucial importance to resource managers, stakeholders, and common property theorists alike is what factors enable some of these institutions to succeed while others fail? Drawing on common property and adaptive governance theories, we examine relationships between socioeconomic conditions, institutional design, and the effectiveness of collaborative management in 5 countries throughout the Indo-Pacific region. This innovative project takes a big picture comparative approach to a subject that has often been studied at a local scale.

Economics of fishing activities

Price flexibility analysis for the lobster fishery for the optimisation of the net profit value of small fishing communities

ID paper: 41

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Dyhia Belhabib, James Wilson Ph.D Since several years, lobster (Homarus americanus) has taken first place in Canada s fisheries, it occupies 50% of the North American market. Quebec lobster represents 6% of eastern Canada landings. During the fishing season in Quebec, supply is at its maximum and consequently, the price is the lowest. Moreover, at the end and after the fishing season, the lobster price is relatively high because of the increased demand at the height of the summer tourist season. This paper seeks to optimize the profit of small communities by capturing temporal price effects. Two hypothesis were developed: In a first step, we analysed the possibility of investing in common pool management that allows fishers to spread their effort over the season, thus possibly taking advantage of variations in price over time. In a second step, the possibility of investing in holding technologies was treated by a techno-financial analysis. This could be essentially an effort to sell the captured stock over a longer period of time, thereby obtaining higher landings prices by taking advantage of late season price spikes. At this point, we tested some technologies and determined the more profitable scenario. Finally, a price flexibility equation as a function of lagged landings, seasonal dummy variables, the exchange rate between the United Stated and Canada, time and inflation rate was estimated using SIMETAR-2008TM and put as a constraint for the maximization of the net present value basing sales on temporal arbitrage. The objective of the combined analysis was to determine whether or not investing in holding technologies was profitable in terms of price variability in a longer term. A comparison between the Nova-Scotia model where many holding technologies are developed, and Quebec model showed that investing in lobster holding technologies in a longer term causes a smoothing of the price variation function. For the maximization of their total revenues, fishermen would adopt an intra-temporal arbitrage for the selling strategy under the condition of the objective of lobster quantity produced.

Economics of Fishing Activities/FA01
Bioeconomic analysis of fisheries

Optimizing intra-annual harvest in the maine lobster fishery

ID paper: 204

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The Maine lobster fishery is one of the most valuable fisheries in the US, but the economic performance of the fishery has been poor and worsening as costs of fuel and bait increase while ex-vessel prices decline. Landing are heavily concentrated in the fall when quality is low, requiring the majority of lobster to be processed for meat rather than sold live. High trap density in peak landing periods also causes substantial congestion externalities. There have been calls to implement management reforms to spread catches over the year to increase revenues. We present a bioeconomic model of the Maine lobster fishery that incorporates a monthly demand model and an empirically estimated production function that accounts for seasonal changes in catchability and in-season depletion effects as well as congestions effects. We use the model to retrospectively identify the monthly levels of effort and catch that would have optimized profits in prior years subject to a constraint that catch is not above the observed catch. We also compare profit under an ITQ system with maximum profit to quantify the potential lost rents associated with congestion and in-season depletion externalities that would not be corrected by an ITQ. The models show that profits could be more than doubled by substantially reducing effort, but that catch would still remain heavily concentrated due to seasonal variation in catchability. In spite of congestion and in-season depletion externalities that remain, rent dissipation under ITQs is projected to be minimal.

Bioeconomic modelling of the bay of saint-brieuc scallop fishery (France)

ID paper: 353

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The scallop fishery of the bay of Saint-Brieuc (France) targets the common scallop (Pecten maximus) and is seasonally operated by some 250 artisanal boats. This fishery is the second largest common scallop fishery in France, representing about 31% of the French common scallop landings during the 2004/2005 harvesting season. During the 2007/2008 scalloping campaign, fishers landed 7,099 tons of common scallop, representing an ex-vessel value of ¬13.5 million. The common scallop landings of the bay are seasonal whereas the French scallop market is annually-supplied and highly competitive. As regards fisheries management, the management of the bay of Saint-Brieuc common scallop fishery is based on a limited entry license system, a controlled nominal effort and a yearly total allowed catch. The paper presents a bioeconomic model where the natural stock dynamics of the common scallop is age-structured and highly variable, and the fleet is divided into four groups. The model is used to analyze the impact of a number of fishery management options, linked to institutional, environmental and economic changes. We propose numerical simulations of management scenarios as illustrations.

Bioeconomic analysis of the norwegian redfish fishery in the barents and norwegian sea

ID paper: 220

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In this study catch, effort and economic data for the Norwegian redfish fishery in the Barents and Norwegian Sea are obtained for a period of 25 years and utilized in a bioeconomic analysis of the open access fishery. Both the logistic growth equation and the Gompertz growth equation are used to describe the biological growth of commercially interesting, slow growing, redfish species (Sebastes spp.) in the North East Arctic. The results of the analysis show that of the two surplus production models the logistic model is more suitable for explaining biological production. The economic analysis of the open access fishery indicates that in the case of North East Arctic redfish, the stock has not generally been over-exploited; opening for the possibility that recruitment failure and the following stock declines displayed by redfish in the Barents and Norwegian Sea could be caused by other factors in addition to the stock being fished down. The analysis furthermore shows that the fishery never reached the static open access effort level before it was subjected to management policies. Instead the effort levels in the fishery varied between the maximal economic yield and the maximal sustainable yield effort level.

A stochastic viability approach for ecosystem-based management of mixed fisheries : the case of the Bay of Biscay demersal fisheries

ID paper: 190

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Marine scientists and stakeholders are increasingly advocating ecosystem-based fishery management (EBFM). However, the way to operationalize such EBFM remains controversial. The viability approach can be a relevant modelling framework for EBFM as it accounts for dynamic complexities, uncertainties, risks and sustainability objectives balancing ecological, economic and social dimensions together with intergenerational equity.
Mixed fisheries operating in the Bay of Biscay provide a challenging example to illustrate these issues. The present paper focuses on the case of the demersal fisheries catching nephrops, hake, sole and monkfish. A bio-economic multi-species and multi-fleets model is developed to examine the capacity for the stochastic viability framework to assist in developing practical approaches to EBFM. The model integrates the dynamics of the harvested stocks with an uncertain recruitment and technical interactions through joint catches. It relies on data from ICES and IFREMER. A co-viability analysis of the fish populations/fisheries system is performed to investigate how to simultaneously preserve the species (using Bpa precautionary referenced points) and guarantee economic incomes for the fleets. First results suggest that the viable harvesting intensities require a significant reduction in the effort of some fleets, as compared to reference year 2006.

Addressing the distribution of bio-economic impacts of management measures between fleets: the case of the demersal fisheries in the bay of Biscay

ID paper: 369

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Assessing distribution of the expected bio-economic impacts of management measures between fleet segments is a main issue for decision making in fisheries management. This requires as a first step a good description of the system and of the interactions between fleets through stocks. Making this assessment operational also needs flexible and fast capabilities to mobilize appropriate data to perform the impact analysis. Bio-economic modelling of the system allows performing simulations of management scenarios and to analyze expected costs and benefits at short, middle and long terms. The paper addresses the question of differentiated impacts on fleets in the case of the demersal fisheries in the bay of Biscay. As mixed fisheries, they are characterized by high technical interactions mainly derived from targeting or by-catching hake, Nephrops, anglerfish or sole and are relevant illustrations to address this question. The fleets involved in the Nephrops, hake, sole and anglerfish fisheries in the bay of Biscay are first characterized in terms of contributions to fishing mortality of these species and gross revenue dependence and their activity, productions and economic profitability are described. The paper then analyzes the impacts of effort and selectivity measures for these fleets through a multi-fleets, multi-metiers, multi-species bio-economic model. Methodological issues are underlined for operational bio-economic modelling and management plan assessment.

Bioeconomic dynamic modelling of the chilean southern groundfish fishery

ID paper: 273

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The groundfish fishery of southern Chile is a complex system including multiple species, fishing fleets and markets. Fishing activity is conducted under a rights-based system for southern hake (Merluccius australis) and hoki (Macroronus magellanicus), where a TAC is allocated in an uneven manner among fleets and operators. New management approaches not only call for the need of the simultaneous consideration of biological, technologic, economic, social, legal and institutional factors but also, stakeholders perceptions and interests are becoming increasingly relevant for decision making. In spite of the undeniable importance for stakeholder inclusion in fisheries management, their perception of the system status and expectations are frequently partial and biased by short term needs and interests. Thus, information on expected impacts of alternative management measures are a valuable guiding input to improve stakeholder perception. This paper, therefore explores the value of dynamic simulation model in providing illustrative information on bioeconomic impacts to the fishery system from alternative management measures. The dynamic simulation model is based on two main modules. A biologic module depicting the fish population dynamics, considering recruitment based on Beverton and Holt function. A bioeconomic module depicting fleet dynamics based investment functions by Clarke and Munro (1979) and Munro (1998) and catch per unit of effort proportional to biomass. The model outputs are the species biomass, fleet size, effort level, fleet and vessel net benefits presented on a year basis. Fishery and fleet cumulative NPVs are also presented.

A bio-economic model for the viable managementof the coastal fishery in french guyana

ID paper: 337

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The coastal fishery in French Guyana is a challenging case study for the implementation of the ecosystem based fishery management. Although the current situation of this small scale fishery could be considered as satisfactory, the viability of the fishery can be questioned. Indeed according to demographic scenarios, the growth of the population will generate an increase of local food demand and therefore growing fishing pressures. Moreover, there is no direct regulation for limiting the fishing catches . Models and quantitative methods to tackle this sustainability issue are still lacking for such mall-scale fisheries mainly because of the various complexities underlying the systems including the heterogeneity of the production factors, the weak selectivity of fleets and high fish biodiversity levels. In the present paper, we both use numerical simulations and a viability perspective to deal with such a problem . We first build a multi-species multi-fleet dynamic model relying on thirteen exploited species and four types of fleets. It accounts for potential trophic interactions, fishing effort and the corresponding costs and revenues. The model was fit on data collected since 2006 by Ifremer : daily production and efforts data, as well as economic data from a survey on the production costs and selling prices in 2009. The co-viability of the system under different scenarios of fishing efforts is studied through ecological and economic performances. The biological viability constraints focus on biodiversity index as species richness or trophic index while economic viability constraints intend to guarantee a profitability to all the fleets.

Technical change in a malaysian purse seine fishery: implications for development and resource management

ID paper: 79

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The impact of technological adoption on economic growth is a critical issue for economic policy in the developing world. The issue is further compounded for industries exploiting renewable common resources with ill-structured property rights, because greater efficiency increases pressure on the resource stock. The paper analyzes the effect of adoption of electronic devices on production of the east coast Peninsular Malaysian purse seine fishery. We find that adoption raises expected catch at all levels of input in the fishery. We also find that technological change is fuel-saving and capital- and labor-augmenting, suggesting that electronics allow greater ease at finding fish and that a larger capital stock and crew contributes to the increased catch. We conclude with a discussion of the implications for sustainable resource management and economic development.

Economics of Fishing Activities/FA03
Fisheries dynamics

The norwegian winter herring fishery: a story technological progress and collapse

ID paper: 22

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The herring stocks in the Northeast Atlantic were nearly fished to extinction in the 1970s. This collapse is usually attributed to advances in fishing technology. The impact of productivity shocks depends critically on how sensitive the fish catch is to the size of the stock. If the catch per unit of fishing effort is proportional to stock size, catches will fall proportionally with stock size. However, for herring the opposite effect seems to dominate, a low sensitivity of the catch per unit of effort to stock size. The purpose of this paper is to determine whether we can measure a statistical causal relationship between technological change and stock decline, and to determine if technological change was the cause of the low sensitivity of catch per unit of effort to stock size. To investigate the former, we define an ARMAX model by augmenting a ARIMA(1,1,2) using the price of herring and technology dummies. The price of herring is a proxy to capture changes in stock caused by fishing effort. We find that the stock was in fact resilient to all technological advances except the power block, which caused the collapse in the herring stock. To investigate the latter, we use an error-correction equation based on an expected revenue model to measure both the long- and short-run elasticity of harvest to stock size. Our results suggest that the low sensitivity of catch per unit of effort to the stock size was not long standing and can be statistically linked to technological change in the fishery.

Technological switching in the Fisheries Sector

ID paper: 449

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Technological switching and re-switching has been the subject of debates within economics. Under assumptions of malleable capital in economies with multiple sectors, the wage-rent envelope can show multiple re-switching. The interest of technological change and switching behavior for fisheries economists and managers stems from the fact that the control of effective effort remains one of the central management problems for that sector, and for many managers, the most elusive. In the fisheries, the trawling technique has been largely promoted in the seventies and eighties. Consequently, path-dependency was developing in such a way that the preferred choice of new entrants into the fishery was this technology to produce wild fish. In this context, it can be argued that technological lock-in has occurred on the trawling technique, making it the most used technique in the French fisheries sector in Atlantic, to the detriment of alternatives, called passive techniques. However, it must be questioned why technical switching, from trawling to passive methods, has not been accelerated due to poorer economic performance for the former technology. This paper addresses the diffusion process of trawling, accompanied by state subsidies. Even if trawling has been commonly defined as a major innovation in fisheries, its potential for technological adaptations or minor innovations is questionable when faced with an increasing energy price, especially in the absence of State aid. JEL : fishery, switching, technological change, capital.

Economics of Fishing Activities/FA03
Fisheries dynamics

Economics of Argentine fisheries: costs, benefits and balancing sustainable management in a developing country context

ID paper: 56

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Fisheries exploitation at a large scale in the South Atlantic is recent. Fisheries have experienced an extraordinary growth in the last 15 years. In Argentina the growth of fisheries exploitation took place at unprecedented rates, and this has been one of Argentina's most dynamic economic sectors in recent times. It has been categorized as the world's fastest growing fishery. Value added grew steadily and exports, for example, grew nearly 500 percent in a decade. Nevertheless, this growth did not take place with adequate acknowledgment of implicit nor explicit adequate management instruments and resulting in near collapse of some species as well as social conflict. When the costs and benefits are analyzed, it is evident that rapid unmanaged growth in fisheries exploitation in Argentina has ended in a crisis situation and near collapse for some species. Conjunctions of factors, mainly associated to international trade patterns changes and management capacity deficiencies, have brought about this situation. At this juncture, a series of analysis are taking place in order to revert crisis situation and recover fisheries, taking into account the particular situations a developing country must face in order to transition to sustainable yet responsible fisheries. The paper analyzes how changes in the Argentine fisheries sector s structure must take place for the implementation of recovery policies while at the same time improve long-term management in a developing country context.

Why the Mexican oyster fishery in the Gulf of Mexico is underdeveloped?

ID paper: 201

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The Mexican Oyster fishery in the Gulf of Mexico annually produces only 50,000 MT, 95% of Mexico oyster production. Oyster production has fallen drastically in most coastal lagoons, this decline has been attributed to factors as overfishing, mismanagement of natural oyster beds, environmental degradation and lagoons pollution. This work proposes strategies for oyster fishery management on Gulf of Mexico littoral. In order to achieve this goal oyster fishery diagnose for Tamaulipas, Veracruz, Tabasco and Campeche states were made for evaluation of ecological, economics, legal and social aspects trough information sources as statistical yearbooks, databases, and published information relative to regional oyster fishery, simultaneously visits to landing places where made and inquiries to production units, directives, fishermen and decision makers were done. Collected information was grouped and analyzed with SWOT analysis. Oyster fishery is carried on in 20 coastal ecosystems where works 51 production units with 2,955 active oyster fishermen. In every visited site were observed water pollution, coastal deforestation and or overfishing. National and international oysters markets cannot grow for several reasons including sanitary quality; there are no efficient models for oyster beds administration, no infrastructure for give oyster products additional value. Some of the strategies for solve these difficulties are, to make local diagnosis and promote social organization for control of water quality, market research for oyster products and laboratory seed production, register efficiently and responsibly catch statistics, to make official norms on size catch, fishing gear, fishing, reception, packing, commercialization, culture techniques, and cultured oyster sizes, these strategies and other programs may permit sustainable and biotechnological development in oyster fishery.

Measuring technological change in artisanal fisheries: evidence from malaysia

ID paper: 200

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We compare the productivity of technology adopters to non-adopters using a cross-sectional survey of artisanal gillnet vessels on the east coast of Peninsular Malaysia. Technologies include cell phones, GPS, sonar, and mechanical winches for hauling nets. Stochastic frontier analysis is used to measure differences in production frontiers and technical efficiency scores. Adopters of mechanical net haulers had low technical efficiency, low labor productivity and high labor use. Electronics adopters were more productive than non-adopters on average, but difficult to distinguish from efficient non-adopters. This is the first paper that we know of to examine the role of new technologies in the production process of artisanal fishers. Our results suggest capital investments in new technology may tie the least successful participants to the fishery despite most respondents self-reported desire to exit. Impacts may be fishery-specific and ambiguous, so the consequences of technology subsidies should be carefully considered in development policy.

Economics of Fishing Activities/FA04
Fisheries dynamics

A tale of two crises: socioeconomic comparison of iceland´s herring collapse in 1968 and banking collapse in 2008

ID paper: 418

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40 years ago the Atlanto-Scandian herring stock collapsed with severe consequences for Iceland´s monotonic economy at that time. Last year the international credit crisis brought the country´s largest banks to insolvency, which shocked the whole economy with butterfly effects in neighbouring countries. The paper begins with an overview of the Icelandic economy, then models the herring collapse and finally describes and compares the effects, negative and positive, of these two crises from an economic, sociological and political point of view. After 1968 gross domestic product and currency rate decreased, but unemployment, emigration and inflation increased. Some economic indicators recovered surprisingly soon because of new resources, diversified industries, an extension of the exclusive economic zone and improved fisheries management, but high inflation and political instability persisted. The immediate aftermath of 2008 is similar, however starker, but no windfall recovery is to be expected. The fisheries will reach culmination, although added value is potential, and exploitation of renewable energy resources may take their place as the most important industry. Rapid globalization of Iceland´s financial activities during the last decade created complications and controversies over foreign debts, which could have long-lasting impeding consequences to delay the necessary reconstruction of fisheries management, industrial companies and social institutions. An attempt will be made to predict the uncertain future economic development according to national and international statistics.

Economics of the recovery of fish stocks: comparison of a npv calculation of a recovery strategy with the real development of the baltic cod fishery

ID paper: 156

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The recovery of fish stocks is in principle an investment decision weighing short term losses against future gains. In the Common Fisheries Policy (CFP) of the EU long term management or recovery plans are a main instrument. One of the basic aims is to move from a short term to a longer term perspective in the management process by having automatic rules how to set quotas in the coming years. This gives fishermen more security on catch possibilities in the future. However, it is not clear if measures in recovery plans are economically feasible or not. Fishermen may lose more than they gain from such a recovery plan. In the first part of the paper we describe the economics behind long term management plans and the rationale of such plans from an economic viewpoint. Secondly, we use the Baltic cod fishery as an example to compare the present value of recovery scenarios and a status quo scenario. As a simplification only one cod stock is assumed in that calculation (in the Baltic Sea a western and eastern stock are distinguished). In the meantime a long term management plan for Baltic cod is in place since 2008. Especially the Eastern stock shows strong signs of recovery because of reduced fishing effort and good recruitment. In a third part we analyse to which extent the general calculations are comparable to the experiences in the real fishery.

Economics of Fishing Activities/FA04
Fisheries dynamics

Evaluation of recovery plans based on a rational expectation model: an application to the Southern Hake fishery

ID paper: 409

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Bio-economic models are increasingly used to provide scientific advice in fisheries management integrating both biological and socio-economic considerations. In this context it becomes important to evaluate how different recovery scenarios will influence the future situation for the fishing fleets, particularly through the investment/disinvestment decisions of fishing capacity. In this paper, we build a rational expectation model to evaluate a recovery plan. To illustrate the model an example has been constructed for the Southern Hake fishery. Optimal control techniques are used to estimate fishing mortality paths in order to reach the recovery plan goals. We compare two different performance measures which correspond to: i) the current recovery plan with ; ii) maximizing the net present profits subject to economic and social constraints

Estimating the efficiency effects of a fisheries buyback

ID paper: 203

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In 2003, an industry-financed, government-administered buyback of trawl fishing permits and vessels took place on the US West Coast, resulting in the retirement of about one-third of the limited-entry trawl fleet. The lack of cost data in this fishery precludes an analysis of how the buyback has affected profitability, but changes in technical efficiency can provide some insight into the program s effects. This paper applies stochastic frontier analysis to assess whether technical efficiency changed perceptibly after 2003. We adopt a hierarchical modelling approach estimated with Markov Chain Monte Carlo methods, and present results from both Cobb-Douglas and translog specifications. The analysis is limited to 13 boats active in Oregon s deepwater DTS fishery, which targets dover sole, thornyheads, and sablefish. The results suggest that the buyback has had little impact on trip-level technical efficiency in the study fishery. However, departures from the frontier are markedly bi-modal, indicating that a mixed-density approach to estimation may be more appropriate.

Economics of Fishing Activities/FA05
Fishing capacity and buyback programs

Fishing capacity of georgian anchovy fishery

ID paper: 229

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Anchovy fishery of Georgia (North Eastern Black Sea) has experienced a considerable decline since the 80ths. The Ministry of Environment Protection and Natural Resources (MEPNR) is in charge of fisheries management since 1994 and is implementing since late 2006 a new licensing system based on auction concept. According this management system, 4 winning bidders owned the right to fish an annual TAC in their lots for 10 years. The success of this management framework is subject to the adjustment of the fleet that exploit this fishery, which is rented by the aforementioned bidders, and the size of the fish stock, and therefore controlling the fishing capacity of the fleet. This paper is aimed at measuring fishing capacity and overcapacity of the fleet that exploits the North eastern Black Sea anchovy fishery in the EEZ of Georgia during four seasons in period 2005-2009. Fishing capacity and capacity utilization are determined using Data Envelopment Analysis (DEA) in order to get this aim.

Impacts of vessel capacity reduction programs on efficiency in fisheries: the case of australia s multispecies northern prawn fishery

ID paper: 316

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Capacity reduction programs in the form of buybacks or decommissioning programs have had relatively widespread application in fisheries in the US, Europe and Australia. A common criticism of such programs is that these schemes remove the least efficient vessels first, resulting in an increase in average efficiency of the remaining fleet. The effective fishing power of the fleet, therefore, does not decrease in proportion to the number of vessels removed. Further, reduced crowding may increase efficiency of the remaining vessels. In this paper, the effects of a buyback program on average technical efficiency in Australia s Northern Prawn Fishery are examined using a multi-output distance function approach with an explicit inefficiency model. The results indicate that average efficiency of the remaining vessels was greater than that of the removed vessels, and that average efficiency of remaining vessels also increased as a result of reduced crowding.

Economics of Fishing Activities/FA05
Fishing capacity and buyback programs

Bidder learning in sequential license buyback auctions: a model of the texas shrimp license buyback program

ID paper: 378

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In this paper we develop a bidding model for fishermen participating in a sequential permit buyback auction. A key feature of the model is a Bayesian updating process, which allows bidders to use information gained from past participation in future bid selection decisions. Our auction model was based on the structure of the Texas Shrimp License Buyback Program, a buyback auction which retired commercial shrimp license from fishermen in Texas s bay system. The fisherman s decisions regarding whether to participate and how much to bid are formulated as a dynamic optimization problem. State variables of the model include distributional parameters defining the fisherman s probability of success in the auction. These parameters are initially unknown to the fisherman but, with each observed outcome, he receives an additional piece of information regarding the true values of the distributional parameters. This framework allows us to explore the role of information and uncertainty in sequential buyback auctions. Auctions have played an important role in fisheries management, as evidenced by the numerous buyback programs implemented within the last decade. Recently, we have also seen auction mechanisms used to implement aquatic habitat restoration programs such as the Klamath Water Bank, which uses a sequential sealed bid auction to purchase water for instream flow to benefit anadromous fish. Our results contribute to a greater overall understanding of the sequential auction mechanism. The model also provides a methodological contribution by presenting a feasible procedure for incorporating agent-specific learning in a model of sequential auction bidding.

Adaptation of fishing communities in the philippines to the impacts of climate change

ID paper: 2

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More than half a million small fishers in the Philippines have been availing of loans from Quedancor, the credit arm of the Department of Agriculture. The financing scheme has been quite successful with repayment rate at 95%. However, the occurrence of natural calamities such as typhoons; as well as pests and diseases has affected the productivity of fisheries, thus, hindering fishers from paying and renewing their loans. Failure to access credit could disable them to continue venturing on fishing activities and could eventually jeopardize the welfare of their entire household. The inability of creditors to pay their loans and meet their obligations also impair, to a large extent, the financial operation and viability of the lending institutions. This study analyzes the natural risks and risk management practices of these fishers. It recommends mitigation mechanisms to minimize the impact of natural calamities. Moreover, it suggests a bridge financing scheme that can be an effective and efficient instrument to enable fishers to carry on their livelihood activities and support their families basic needs and slowly recover from their losses.

Economics of Fishing Activities/FA06
Risk and uncertainty in the fishing industry

Measuring the effects of quota rights on biological and economic sustainability in the new zealand lobster fishery

ID paper: 456

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The New Zealand Quota Management System has evolved significantly since its inception in 1986. Focusing on the New Zealand lobster fishery, this paper evaluates the effects of tradable quotas in a specific fishery on both biological and economic sustainability. Measures of biological sustainability are notoriously qualitative. To address this, an alternate measure is proposed based on the likelihood of sustainability. Using this model-specific measure of how risk and uncertainty are treated in harvest models, it can be demonstrated that the lobster fishery in New Zealand has grown increasingly sustainable in biological terms since the introduction of ITQs into the fishery in 1990. Institutional economics explains why this occurred. Changes in contracting and coordination among quota owners in New Zealand lobster fishery led to industry production and evaluation of both raw fisheries data and harvest models. Rather than set harvest targets, the models began to target stability and abundance of the lobster population and higher CPUE. As a result, particularly when compared to a similar lobster population dynamic in New England, it can be shown that the lobster fishery in New Zealand has also become more economically sustainable.

Measuring fishing vessel safety and risk taking

ID paper: 146

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Commercial fishing is a dangerous occupation, and accidents are bound to happen given the operational environment within which fishing is conducted. Fishery regulations have been shown or presumed to affect vessel safety. NOAA Fisheries is promoting the adoption of catch share based fishery management programs nation-wide as one way to improve vessel safety. As such, vessel safety has been identified as a key measure of the performance of share based management regimes. Despite the emerging focus on safety little research has been conducted to quantify changes in accident rates or risk taking. Our previous research developed models of accident and trip taking probability in North Atlantic U.S. EEZ fisheries. For the time period of analysis (1981 2000) accident rates were found to be declining. Trip taking probability was inversely related to wind speed, although tradeoffs between exposure to risk and expected revenue were found. Finally, no systematic management effect was evident from this analysis. We now expand on this research to examine alternative measures of fishing vessel safety and risk taking. Considerations include more expansive treatment of accident types, measures of accident severity, and alternative measures of accident rates. Because accidents are conditional on the decision to take a fishing trip, we also further explore incentives to engage in risk taking and how they may be affected by management regime. The performance characteristics of the most promising metrics are evaluated using data from several different regions in the U.S.

Economics of Fishing Activities/FA06
Risk and uncertainty in the fishing industry

Uncertainty and risk in the ecosystems approach to fisheries management: some insights from an ecosystem computer simulation model

ID paper: 3

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Understanding the complexities of ecosystems is difficult enough, but when the human dimension is added to the inherent uncertainty and risk in fisheries management, the actual versus expected results move from the counter-intuitive to the paradoxical. Without an adequate understanding of the interrelationships between ecosystem components, including the human dimension, scientific management becomes intuition-based management, which is often counterproductive to achieving desired goals and objectives. A computer simulation model is developed for multiple species, resource areas, stocks, and cohorts. To explicitly incorporate ecosystem effects predator-prey and competitor relationships are constructed to interpret interactions between different species of fish. Fishing fleet dynamics are captured by modelling multiple vessel classes based on specifications for catchability and concentration profiles. Additional uncertainty is included through the effects of market supply and demand on price for different discount rates. Economic impacts are also estimated for each point in time as biological and market conditions change. This simulation model results are then compared to determine if the management objective of maximization of net benefits subject to the fish stock conservation goal are achievable in an ecosystem context while also considering impacts on jobs, income, and sales. Insights from this simulation of an ecosystem should provide information on the needed research required for the ecosystem approach to fisheries management to be successful in achieving its multiple objectives.

Coping strategies under uncertain environment: the case of Mexican coastal fishers

ID paper: 84

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Fishers from coastal communities have been facing hazards of different nature. Those stressors plus high fishing pressure have contributed to resources deterioration, which in turn affects people s livelihood, creating a vicious circle. In order to understand this vicious circle and to explore how this could be turned around, in this paper we identified the main socio-economic and environmental hazards people are confronted with and the coping strategies they have developed to face them. Based on community perception, we undertook a study in two coastal communities in Yucatan, Mexico during 2008, using participatory observation and interviews. The study is based on theories of resilience and coping theory. High dependency on fishing makes coastal communities economy extremely vulnerable to fluctuations on fishing resources. Factors that have been affecting their fisheries include: hurricanes, red tides, pollution and illegal fishing. Social problems reported by members of both communities include alcoholism, drugs and political conflicts. A mix of proactive and reactive strategies has been developed by different groups of fishers in order to deal with uncertain ecological and social environment. Socio-economic conditions, skills, and networking, seem to influence the strategies each group of fishers have been developing to face different types of hazards. We present a conceptual framework to discuss the link between the type of strategies people develop and their adaptive capacity that allows them to respond to increasing stressors that affect their livelihoods.

Western rock lobster fishery: a case study in fisheries management from success? to recruitment failure? and where to now?

ID paper: 428

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Australia s western rock lobster fishery is its most valuable fishery, yet it has been beset by problems of miniscule recruitment over the past 3 years. It was the joint first MSC certified fishery first in April 2001, recertified in 2006 and again in Jan 2010. Despite this, it has suffered all the well known issues of an open access fishery and even in its current management mode is subject to ever shortening seasons and lower prices in the race to fish . The paper uses a case study approach to highlighting the issues faced by most fisheries during their lifespan, from a progressive concentration of fishing and processing effort with business diversification and monopoly like behaviour attempted to reduce/diversify risk by its most successful participants. The paper analyses why undiversified fishing is too risky even for vertically integrated and well diversified Japanese style fishing and marketing companies. The current situation is forcing a major rethink by the industry s leaders with ITQs again on the agenda to replace the current but failed individual effort limit (ITE) policy.

Economics of Fishing Activities/FA07
Risk and uncertainty in the fishing industry

Toward capturing model uncertainty in bioeconomic models

ID paper: 198

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A major simplification in bioeconomic models is that the model parameters and functional forms are assumed known. In fisheries, the failure to capture model uncertainty can easily cause overconfidence in model outputs and resultant policy recommendations. Although fisheries modelers regularly assume rather complete knowledge of the systems they study, in reality the biological uncertainty about these systems is often very poorly understood. Consider recent experience in the red snapper fishery in the Gulf of Mexico. Despite years of scientific effort, a recent assessment made substantial revisions in the population s health. As shown by Smith (Marine Resource Economics, 2008), parameter uncertainty can have dramatic effects in terms of management, especially since learning and management are taking place simultaneously. In recent years, researchers in economics and operations research have focused increasingly on using robust optimization, approaches that can take into account the underlying uncertainty in a system. However, applications in fisheries have been limited (Xepapadeas and Roseta-Palma, 2003; Woodward and Shaw, 2008). This paper addresses the problem of incorporating parameter uncertainty in a simple stochastic bioeconomic model. Specifically, we explore the differences in policy performance under solutions from a nominal model based on point estimates, a robust alternative that recognizes parameter uncertainty, and a percentile-optimization approach that provides a tuning parameter representing risk aversion. The paper will seek to provide fisheries economists with an introduction to applied tools used to carry out such analysis and argue for the importance of embracing rather than ignoring system uncertainty.

Assessing risk and uncertainty in fisheries rebuilding plans

ID paper: 244

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This paper deals with risk and uncertainties that are an inherent part of designing and implementing fisheries rebuilding plans. Such risk and uncertainties stem from a variety of sources, biological, economic and/or political factors, and are influenced by external factors like changing environmental conditions. The aim of this paper is to characterize such risks and uncertainties and to assess the importance of it in relation to the performance of fisheries rebuilding plans, to give some examples where uncertainties have negatively affected the ability of rebuilding plans to reach their intended targets and to give some guidelines how to deal with risk and uncertainties. The conclusion is that when designing fisheries recovery plans, it should be taken into account the availability of relevant information, such that progress is (indisputable) measurable, and causes of potentials failure can be clarified. Recovery plans need to consider both biologic and economic consequences in order to reduce uncertainties and to ensure successful implementation of the plan. Risk communication is also valuable in the process, since it gives transparency of the objectives and means to meet these objectives, elucidates crucial information from stakeholders and legitimates the whole process of designing and implementing the recovery plans, which is essential for the success of these plans. To that end the plans should be as simply and realistic as possible. It is recommended to apply risk analysis and to use the precautionary principle only in cases where large uncertainties cannot be resolved. Two fisheries rebuilding plans are analysed and how they address risk and uncertainties are evaluated.

Fishery management when biological and economic uncertainties are correlated.

ID paper: 485

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Economists studying the management of fisheries have universally assumed that uncertainty in harvest cost is unrelated to uncertainty in biological growth or recruitment. Here it is argued this restriction is unrealistic. I provide examples of commercially valuable species that are impacted reproductively and behaviorally by a single environmental variable (e.g., temperature), leading to large and correlated variation in biological growth and harvest costs. A general analytical model examines the importance of correlated uncertainties for choosing optimal escapement targets, and shows how ignoring this possibility leads to efficiency losses and precludes the informational value of observing harvest costs before hard targets are set. Three harvest control mechanisms (HCMs) are then evaluated under this regime: tradable effort quotas, tradable harvest quotas, and landing fees. It is shown that structural assumptions (e.g., the way in which uncertainty enters the growth function) play a significant role in the management response to correlated uncertainties and the relative superiority of HCMs.

The effect of remuneration system on the economic performance of small scale vessels- the case of purse seining in the south central-vietnam

ID paper: 60

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It is implicitly several economists point out that there is a relation between remuneration system and the economic performance. However, in my knowledge, none of them examines how these payments affect on the economic performance of fisheries. This study is an empirical study analyses the impact of remuneration system on the fisheries economic performance. The overall objective in this study is to analyze how important of remuneration system on the economic performance of fisheries in Vietnam. The case of the purse seine fishery in Khanh Hoa province will be used for estimation. This question has also arisen in a context of a comparison of the efficiency of two types of remuneration system- the pure share payment and the fixed wage plus share payment which are typical of the small scale fisheries in the South Central of Vietnam. Of additional interest is to determine which factors influence on payment contracts of small scale purse seine fishery in Khanh Hoa, Vietnam. On the other hand, this study will try to relate fishermen s behaviour of choosing remuneration system to social, economic and demographic variables. These implications are useful information for decision makers and fishermen in adjustment of their behaviour toward to efficiency gains.

Spatial allocation of fishing effort discriminated by fishing gear in a multi-species fleet

ID paper: 85

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It is generally assumed that multi-species fleets operate in a generalist fashion, given diversity of gears employed. An analysis of gears, species and spatial fishing effort allocation can give an indication if those patters are indeed common in these types of fleets. In this paper we examine the fishing operations of a semi-industrial multis-pecies fleet that operates at the Campeche Bank, Mexico to define, how fishing effort is allocated depending on the fishing gears employed. The analysis was undertaken based on information of 8,566 fishing trips from logbooks recorded by fishers and information obtained through interviews between the years 2000 and 2003. A non-mentric multidimensional scaling analysis (MDS) was used to discriminate operations based on the gears employed and a similarity analysis was used to define species targeted by the identified groups. Results showed that despite that the fleet targets a mix of species, some level of specialization can be observed given the gears employed and the fishing areas where the fleet operates. Two of the fishing gears were more selective than the rest of the gears, which showed some degree of overlap. Spatial allocation of fishing effort also showed preferential operation zones depending on the gear employed. From the analysis was evident that the muti-species fishery uses a mix of mix of specialist and generalists strategies. This analytical approach showed to be useful to identify both the spatial fishing effort allocation and the fishing strategy of commercial fleets.

Economics of Fishing Activities/FA08
Fishers behavior

Location uncertainty in random utility models: determining the value of coral reefs

ID paper: 114

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Greater interest in ecosystem management has sparked interest in examining on-the-water location choices of fishermen; however, some studies still rely on self-reporting due to high costs or governmental restrictions in obtaining GPS and satellite information. Self-reported data may be inaccurate due to spatial comprehension difficulties or an unwillingness to truthfully report on-the-water locations. This study examines the implications of uncertainty in self-reported data on willingness to pay estimates obtained from random utility models using self-reported data from recreational anglers in Puerto Rico. Inability to translate on-the-water locations to grid cells on a map and concerns about area closures may have adversely impacted the quality of data obtained from these fishermen. This study examines the effects of different forms of locational uncertainty on the estimated value of coral reefs around Puerto Rico.

Fishing for what? Fisher decision making in the South-west of England

ID paper: 277

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A key area of fisher decision-making is where to fish (location choice). In temperate commercial fisheries, predictions of location choice currently depend on modelling techniques, which assume that fishers have perfect knowledge of the resource and that fishing location is determined by catch value. However, a number of behavioural theories from different disciplines and supporting empirical studies indicate that fisher decision-making is underpinned by complex and heterogeneous strategies that respond to particular human, social, cultural and economic contexts. Fishers may trade-off profit-based goals with other objective functions such as risk minimisation, well being, and consumption satisfaction. Fishers may also have profit maximising goals constrained by lack of knowledge, ability, computational limitations (ability to calculate all options), as well as the institutional structures present in the fishery and community. We present a case study of fisher location choice in the South-west of England based upon an interdisciplinary approach. We use a random utility model (RUM) to understand and predict where fisher s choose to fish, using data from catch and effort logbooks and the vessel monitoring system (giving vessel position data). We combine the model with data from interviews, providing a more in-depth and context specific understanding of why fishers make the decisions they do, and the trade-offs they face. We conclude that a more accurate understanding of resource-user dynamics can be achieved by coupling the analytical strength of the natural sciences with the context specific depth of social science methodology.

Time discounting behaviour of small-scale fishers in open access and traditionally managed reef fisheries

ID paper: 188

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Fisheries economics theory suggests that weak fishery management institutions, such as an open access regime, provide the motivation for fishers to act as if they have infinite discount rates. This theory has serious implications for the management of small-scale reef based fisheries in developing countries, many of which are open access and in a state of Malthusian overfishing. Yet, there has been limited if any empirical study to investigate this crucial assumption. To address this, we examine 1) whether small-scale fishers in an open-access fishery have infinite discount rates; and 2) the role local fishery institutions play in the formation of fishers discount rates. To do this, we elicit fishers discount rates in two overexploited, small-scale reef fisheries that are under different institutional environments: fishers in Sabah operate under an open access regime, while Fijian fishing grounds are governed under customary marine tenure. We find that fishers in both locations have high annual discount rates that are on average over 200%. Compared to Fiji, a larger proportion of fishers in Sabah chose an infinite discount rate. At the same time, within Sabah, a larger proportion of fishers had lower relative discount rates. Our results suggest that fishers under both open access and customary management arrangements are prone to high discount rates; thus, providing property rights to fishers or fishing communities may not be a fail-proof solution to encouraging sustainable fishery use. Importantly, social capacity to self-organise and create and enforce rules to govern fishery resource use may be an underlying factor contributing to lower discount rates, even in an open access fishery, where there are no formal management regulations in place.

An attitude approach to measure the entrepreneurial profile of sri lankan fisher folk: an untold story

ID paper: 226

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This study aims to identify the entrepreneurial character that creates fisheries as a profitable and attractive business and to categorized fisher folk based on their entrepreneurial profile. Study locations were two popular fishing hubs located in Western coast (Negambo) and South Western coast (Beruwala) of Sri Lanka. The study sample composed of randomly selected 164 fishers from Negambo and 144 fishers from Beruwala. Interviewer administered, pre tested, structured questionnaires were supplied the primary data on entrepreneurial profile of the individual fishers. Self-awareness, self-motivation, courage, confidence, patience, decisiveness, experience, knowledge, perseverance and drive were measured to construct the entrepreneurial profile of individual fishers. Fishers were categorized into 5 groups based on scoring technique.

What is behind fleet evolution: application of a flow analysis to the french fisheries

ID paper: 202

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If the study of the fisheries dynamics increasingly seeks to take into account the evolution of fishing fleets, the main mechanisms which govern their evolution at the local, national or international levels, are often not studied at all, or only partially studied. This applies in particular to vessel entry and exit or fleet transfers between fisheries and/or regions through second-hand vessel markets. These vessels movements also linked to owner s flows, with owners of the invested capital deciding to stay or to leave a particular fishery or region. The aim of this paper is to identify what the key processes in the evolution of a fleet are by characterizing both the movements (flows) of vessels and owners. A typology of the flows of both vessels and owners is drawn based on entry, exit and vessel trade on the second-hand market. The approach is applied to the case of the French fishing fleet. The following flow analysis identifies structural elements of the fleet dynamics and for various scales of analysis. The approach also attempts to link the evolution of fleet structure to fisheries management, particularly in relation to the provision of economic incentives (subsidies to vessels building, scrapping) and fishing rights allocation mechanisms. Finally, the prospects for applying this approach across Europe are discussed.

Economics of Fishing Activities/FA09
Fishers behavior

A meta-analysis of fisheries fleet dynamics models: the techniques and theoretical approach used, the variables included, and the policy purpose of the models

ID paper: 305

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This paper provides a review of the current state of fleet dynamics modelling, embracing the range of techniques applied and theoretical approaches utilised. It is important to understand the range of different approaches and best practice in fleet dynamics modelling to ensure models that are developed in the future are state of the art and can be successfully used for instance in the Management Strategy Evaluation (MSE) framework. We undertake a meta-analysis of fleet dynamics models in which the results from existing studies are combined and integrated. Statistical techniques are used to interpret the results and to identify commonalities in the studies. Firstly we review the techniques used to model fleet dynamics and record progression over time. Secondly we review the theoretical underpinning of the fleet dynamics models. This will inform the inclusion or otherwise of economic and non-economic and non-observable drivers of fisher behaviour. It will also inform the inclusion of higher level social and cultural impacts on individual behaviour and the dynamics of the fleet. Thirdly we combine information from the different models to produce more general knowledge concerning the key determinants of fleet dynamics. A vote-counting approach will be used to determine the most commonly included variables. Lastly we record the impetus for creating the fleet dynamics models, be this in response to (for example) a specific policy issue, the need to predict the effect of a proposed management change, or the need to evaluate catch quotas.

Capital utilization and investment decisions: a case study for the netherlands

ID paper: 356

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In this paper a data envelopment model is presented to evaluate short term investment decisions in the Dutch beam trawl and demersal fleet. We investigated how short run profit drives investment decisions and how a data envelopment analysis can be used to show what the optimal level of capital use is and how investment in variable and fixed inputs can optimize the output of the sector. The degree of capital utilization can be seen as a measure of whether firms should invest or disinvest in their capital assets. Capital utilization also measures to which extent idle and excess capacity is present in a firm. Differences in capital utilization mainly depend on the degree in which a firm can adjust fixed capital in the short run. It therefore should be a key economic parameter to evaluate the performance of a sector. We measured the physical capital utilization for the Dutch beam trawl and demersal fleet for 2005 and decomposed the capacity utilization into technical efficiency, economic capital utilization and optimal capacity idleness. Furthermore we illustrated how the economic capacity measure can be used to predict investment decisions in the fleet. Results show that economic capital utilization inefficiency is on average 13%, which indicates that landings could have been 13% higher then they were if the fleet operated 100% efficiently. About 1% of the capacity utilization inefficiency is caused by idle/excess capacity. This very low percentage indicates that there are few indivisibilities in the input for the Dutch beam trawl and demersal fleet. Based on short term profit maximization it is clear that it is optimal to make as much use of the available capital as possible. The remaining 12% can be attributed to economic capacity inefficiency and technical inefficiency in the fleet. Vessels with a low capital utilization are more likely to disinvest than vessels with a high capital utilization. Vessels with a capital utilization that is higher than unity almost always will choose to invest.

Economics of Fishing Activities/FA09
Fishers behavior

Estimating a supply function for the Galician fleet in the Celtic Sea Fishery

ID paper: 336

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The aim of this work is to estimate the supply elasticity of the fish regarding the variations in one of the most important running costs (fuel cost) for the Galician fleet in the Celtic Sea. The Spanish fleet involved in the Celtic Sea fishing grounds, also known as the 300 fleet , as when Spain joined the EEC it was made up of this number of vessels, presently has 199 vessels (the 70% of them operate from Galicia).This fleet mainly catches hake (merlucius merlucius), anglerfish (Lophius piscatorius and Lophius budegassa), horse mackerel (trauchurus trauchurus), megrim (Lepidorhombus whiffiagonis) and nephrops. Although it is currently possible to associate specific target species with particular fleets, various quantities of hake, anglerfish, megrim and nephrops are taken together, depending on the gear type. A supply function for each species has been estimated as an expression that depends on the price of fish, price of other fish landed by the fleet and the fuel price. The preliminary results indicate that the supply of some species is more elastic regarding the fluctuations in fuel prices than other ones. It could explain the strategy of the fleet for selecting the less elastic stocks to the fuel costs.

Expected catch rate and recreational fishing effort: implications for management in the western australian west coast demersal fishery

ID paper: 212

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The West Coast Demersal fishery in Western Australia includes some highly prized recreational fish: dhufish, pink snapper and baldchin groper. Following a recent assessment that found these stocks are under threat from overfishing, a range of new regulations designed to restrict effort have been introduced with the objective to facilitate stock recovery. Recently adopted measures include commercial fishing bans, restricted and closed recreational fishing seasons and dramatically reduced bag limits, although the recreational fishery remains open access. Proposals for higher licence fees were rejected. This paper uses a model of recreational fishing behaviour in which effort is determined by key variables such as trip cost, number of fish caught, catch rate, and size of fish caught, to analyse how fishers might react to these management changes. The particular focus is on how fishers might respond to catch rates. If fishers respond to catch rate improvement by increasing effort, then stock enhancement gains won via closed seasons and other policies might be dissipated. A survey of 380 individual fishers in the West Coast Demersal fishery carried out prior to the most recent management changes is analysed to investigate this issue. The survey collected information on catch (kept and released) by species, fishing costs, satisfaction with catch, and the broader fishing experience, socio economic descriptors and willingness to pay. Poisson and negative binomial regression models are used to estimate the relationship between annual trips and catch rate by targeted and other species. The model is used to derive and estimate the catch rate trip elasticity. This estimate is then used in the model to simulate the change in trip cost needed to neutralize any effort response to an increase in expected catch rates.

Sustainable management of fishery resources and development in Africa : Sustainable management of artisanal fisheries and local development in Senegalese coast facing the globalization of fish market

ID paper: 131

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In Africa, the artisanal fishing plays a crucial role in the economy and nutrition of populations. She participates in the equilibrium of the balance of payments, and generates significant jobs. On the coast of Senegal in particular, artisanal fisheries ranked first in economic activities. It carries more than 1.8% of GDP, over 12% of the total GDP of primary industry and is the main source of foreign currency in the country with 280 million euros of income (Missions, 2006). Artisanal fisheries also carries 87% of fish production on the coast and provides supply the domestic market, 60% of export industries of fishery products (CRODT, 2000). It occupies a significant part of the Senegalese population (600 000): over 52 000 fishermen (CRODT, 2006) and induced jobs related to artisanal processing and fish trading. It contributes significantly to food security of the Senegalese population: the fish is their main source of protein intake (75%). However, fishing is now in environmental crisis: the exhaustion of stocks of fisheries, decreased the size of species caught (Octopus vulgaris, Epinephelus aenus, etc.), and lower landings of demersal species. This situation leads to socio-economic crisis with falling incomes of fishermen and the impoverishment of families. As aggravating factor, we find the last few years, the supply of increasingly difficult market and local channels of processing scale, more and more products being exported to the EU. The crisis is indicative of very poor governance of the entire fishing industry. Lack of supervision of actors in the sector, free access to the resource, the importance of industrial fishing licenses issued to international partners who operate unabated fishing areas are emblematic of the lack of reflection global problems of resource management, regulatory actors and the organization of streams in Senegal and, more broadly, in all the coastal countries of West Africa in a context of growing local demand for food, competition Global access and control of resources, and necessary environmental management of internationalized production areas coveted. Facing the challenges of globalization, but also local development, what policies and development strategies and sustainable management are put in place in the area of artisanal fishing? Keywords: Artisanal fisheries, Senegalese coast, local development, globalization, sustainable management of fisheries resources.

Governance challenges facing african fisheries

ID paper: 385

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We examine the realities of selected African fisheries, and assess the extent to which the existing governance assumptions and management arrangements are appropriate. Fisheries management in sub-Saharan Africa is largely derived from a target resource management paradigm, with interventions largely focussed on limiting fishing effort for single stocks. We argue that this approach is appropriate for commercial fisheries, and that the main challenge is effective monitoring control and surveillance (MCS). For the artisanal and subsistence sectors which dominate African fisheries, the target resource management approach is often inappropriate, as is the no management approach. In the context of poverty where few other livelihood options exist, poorly conceived interventions (sometimes promoted as co-management but still essentially target resource focussed), create new problems, conflicts and perverse incentives amongst communities. A problem is that the governance assumptions underlying fishery departments management interventions are often at odds with traditional fishing practises, and departments lack manpower capacity capable of facilitating negotiated governance solutions. Experience shows that in a context of poverty, policy needs to be focussed more broadly on developing livelihoods based on the economy of all resources at the disposal of the community. If such a people centred approach is adopted, it needs to be accepted that the fishing of certain target species may not be sustainable due to uncontrollable fishing effort. MPA s may thus be one of the few tools available to mitigate this impact, and ensure species survival.

The Java Sea small-scale fisheries in changing environment: Experiences from Indonesia

ID paper: 218

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The north coast of Java Sea is home to thousands of small-scale fishers fishing for small pelagic fish. The small pelagic fisheries have been the main economic and social activities for coastal communities where other alternatives are limited. The fisheries have been experiencing turbulent states during the last thirty years due to various transitions in regulatory regimes. As early as twenty years ago, the fisheries have been declared as overfishing, and the livelihood of the fishers has continued declining ever since. Government of Indonesia has initiated various policy schemes to save the fisheries, including the recent introduction of right based coastal areas to address ill-defined property rights in fisheries. Nevertheless, the results of such policies are unclear. Poverty and resource degradation are still rampant in the area. This paper attempts to address the fate of the fisheries within different policy regimes from centralized policy to decentralized policy. It also addresses how the transition from de facto open access to more regulated regimes designed to achieve responsible fishing has been a failure. Lessons learned are then drawn, and policy prescriptions are recommended for the fishery in the future.

Economics of Fishing Activities/FA10
Small scale fisheries

Managing small-scale fisheries confronted with socio-economic changes in new caledonia (south pacific)

ID paper: 317

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On the rural Northwest coast of New Caledonia, the settlement of a world class mining complex has initiated rapid socio-economic changes, linked with a considerable demographic increase (+ 65% between 2007 and 2015) and plentiful job opportunities. In 2007 and 2009, studies on fisheries and commercialization of reef finfish and invertebrates were conducted to assess how these changes could impact resource-use patterns. Results showed that 1) economic, 2) social and 3) ecological changes were expected. 1) The increase in demand (+70%) may strengthen the market for marine products through the increase in local commercial fishing or external supply that would diversify and lessen local fishing pressure. 2) The lagoon uses were strongly linked to the social background of fishers. Subsistence and recreational fishing practises were part of ways of life in this rural area and may be modified by the ongoing local economic boom. 3) The overall fishing pressure (0.26 t/km²/year) was low. However, its spatial distribution showed that some areas were close to overfishing. Results suggested that the expected rise in commercial and recreational fishing could lead to unsustainable exploitation levels in these zones. Given the scope of potential changes, public authorities have to manage changing lagoon uses to balance the indirect effects of economic development on the local natural and social landscape. They will have to choose options that would support the development of local fisheries, representing about 500,000 of sales a year, or maintain the present social organization and ecological status of reefs.

Mediterranean fishing strategies and interactions between small scale fisheries and trawlers in the Mediterranean hake Fishery

ID paper: 381

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Mediterranean fisheries are characterized by a high diversity of fishing strategies that can be differentiated according to a gradient from the coast to the offshore area. Over the gradient, fleets interact through the resource. The paper first provides a description of the fishing strategies and proposes a typology for the French Mediterranean fleet based on this gradient. A focus on the interactions between fleets is then provided through the example of the Mediterranean hake fishery. In this fishery, two main strategies, small scale gillnetters operating in the 3 milles area and trawlers operating more offshore, compete for the resource. A description of these two segments is provided and the management implications of the technical interactions are highlighted.

Economics of Fishing Activities/FA11
Small scale fisheries

Small-scale fisheries transition to sustainable and responsible fishing in india - a micro level study

ID paper: 36

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Small-scale fisheries play an important role in generating employment, income and livelihood to the fisherfolk. It constitutes 81 per cent of the total fisheries sector in India. But, this sector remains neglected and the fisherfolk are socially and economically backward. Even after six decades of planned development nearly 62 per cent of the fisherfolk families do not possess crafts. Resource constraints coupled with absence of fishing and other related infrastructures in most of the fishing villages compel fishermen households to migrate to earn their livelihood. Migrant fishermen formed a new village and follow simple method of fishing, which are eco-friendly, economical in the use of fuel and gears. Their responsible fishing is useful for fishing without any by-catches and wastage of marine resources. With this theoretical background, this paper is framed in such a way to analyze the factors that contribute to the transition of small-scale fisheries to sustainable and responsible fishing in Tamil Nadu, India. Factors which hamper small-scale fisheries development have been discussed. The main focus of the study is on the impact of fishermen migration on the socio-economic status of migrants and also the sustainability of fishing operations without class conflict. In the light of the findings of the study, suggestions are also given for the socio-economic uplift of the fisherfolk. This study will be a eye opener to the policy makers to encourage hooks and long lines fishing (as in the study area) for the sustainable livelihood of fisherfolk.

Economic and social characteristics of the hawaii small boat fishery

ID paper: 153

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More than half of the world s annual marine fish catch are landed by small scale fisheries. However, most small-scale fisheries have not been routinely or comprehensively managed. Understanding the social and economic characteristics of small scale fisheries is the first step towards enhancing their management and governance. To this end, a socioeconomic survey was conducted on Hawaii small boat fishing vessel operators during 2007 2008. The Hawaii small boat fishery is a complex fishery comprised of mixed-motivation fishers and diverse scales of fishing activity. Fisher classification complicates management of the fishery as existing regulatory frameworks do not consider cultural motivations for fishing, and legal definitions do not adequately describe fishing activity, motivations, and attitudes. As the United States moves towards quota management and catch share systems, the heterogeneity of this fleet may create unintended consequences from regulatory proposals including issues of reduced food security, restrictions in community social development, erosion of fishing cultures and lifestyles, and a failure to provide a subsistence way of life for those participating in small-scale and traditional fishing practices. It is important to ensure that small-scale fishing is not marginalized. Based on the results of the statewide survey, we characterize the fishery on numerous factors such as catch level, market participation and access, and indicators of social importance. The findings from this study will have important implications for small-scale fisheries facing similar challenges.

Economics of Fishing Activities/FA11
Small scale fisheries

Do financial assistances properly address small scale fisheries problems?: The case of small-scale fisheries of the North Coast of Java.

ID paper: 219

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One of the main obstacles faced by small-scale fisheries in developing country is lack of financial capabilities. In order to overcome such a constraint, government in developing country often provides subsidies and small loans in various forms to offset the difficulties in accessing financial markets. Small-scale fishery in northern coast of Java is such a typical fishery where heavy subsidies in forms of soft loans and small credits have double-edge swords effects to both resource and fishermen. Micro credits and other forms of small loans only address the short terms problems and provide partial solution to the overall fisheries problems in the area. This paper explores the experiences of small-scale fisheries in the northern coast of Java with respect to the impact of subsidies and small loans (micro credits) on their fishing activities as well as their livelihood. The paper also addresses how other non-conventional financial assistances address the poverty and fishing problems compared with government-driven assistances.

Small scale fisheries analysis in a sustainable development perspective

ID paper: 157

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An international symposium devoted to Research and small-scale fisheries in Montpellier (France) in 1989 came from increasing evidence that the complexity of small scale fisheries calls for applying knowledge from many fields in combined studies that can take advantage of a whole range of information . Has this assessment changed twenty years later ? The references to sustainable development and to socio and bio-ecological diversities have highlighted the relationships between small-scale fisheries and natural, economic, social, cultural, and institutional aspects. In this paper we exemplify such interactions in different small-scale fisheries contexts in relation with poverty and food security issues. We question the consequences of different types of fleet dynamics in terms of adaptability, vulnerability and resilience of harvested ecosystems, and the impacts of the regulation systems on fishing communities. More generally, we question the paradigm of sustainable self-regulated small-scale fisheries. Finally, with references to several worldwide case studies and ecosystems we provide a description of the diversity of small scale fisheries, of the frameworks that represent them, and of associated sets of relevant indicators used in monitoring and management programmes. This presentation may be a first step toward the provision of a revisited pluridisciplinary research framework for small scale fisheries. This could be based on a network built in order to mobilize knowledge from a more comprehensive set of concrete and diverse states of small-scale fisheries

How do harvest rates affect angler trip behavior?

ID paper: 28

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Incorporating catch or harvest rate information in repeated-choice recreation fishing demand models is challenging, since multiple sources of information may be available and detail on how harvest rates change within a season is often lacking. This paper develops a framework for evaluating which source(s) of information should be used to improve predictions of the observed patterns of fishery participation and trip frequency. In an application to saltwater salmon fishing in Alaska, a repeated mixed logit model of trip frequency and distribution is estimated jointly with individual-specific angler shadow values of time, and we find that both of the two available harvest rate information sources contribute to better predictions and should be used. In addition, information on whether a species is being targeted makes a significant improvement to model performance. Model tests indicate that (a) non-targeted species have a significant marginal utility; and (b) it is different from the marginal utility of targeted species. The median value of a fishing choice occasion is approximately $50 per angler, which translates to a season of fishing being valued at approximately $2,500 on average.

Economics of Fishing Activities/FA13
Recreational fishing

Demand heterogeneity for southern california sportfishing trips

ID paper: 81

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This study estimates the demand for saltwater recreational angling trips within the Southern California Commercial Passenger Fishing Vessel (CPFV) fishery. The CPFV fishery provides a variety of trip types to support recreational anglers targeting several species including, tuna, rockfish and shark. Trip types vary by location of fishing in US or Mexican waters, by length of a 1/4 day to 15 days, and by booking at an individual or charter basis. The demand for recreational trips is modeled using a travel cost framework within a utility theoretic semi-logarithmic incomplete demand system for an arbitrary number of goods. A multivariate compound Poisson estimator is applied to a trip level dataset which includes catch, spatial, temporal, environmental, and price characteristics, as well as recreator residence data. The empirical model handles correlation between goods and provides a systems approach to account for simultaneous changes in catch, environmental and price characteristics. Empirical results provide demand estimates for saltwater CPFV fishing trips across trip type and target species strata, and provide welfare estimates for changes in associated characteristics. Estimates of the multivariate compound Poisson estimator are compared to base model estimates. Results highlight the need for an approach that handles the dynamic behavioral and statistical interdependencies over goods and common covariates in the estimation of a demand system.

Fishing for the truth: an examination of the effects of task complexity on choice experiment responses for recreational fishing management

ID paper: 113

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Environmental resource values are often obtainable only through stated preference or hypothetical surveys because other nonmarket valuation methods only account for part of the resource value or are unsuitable. Despite the recent popularity and many advances in discrete choice techniques for nonmarket valuation, the implications of questionnaire structure, namely framing and task complexity, are rarely considered. Participant preferences may not be accurately reflected in stated preference willingness to pay estimates if the results are affected by cognitive or response issues. This paper compares the effects of task complexity on modelling outcomes and WTP estimates for nonmarket goods. Specifically, I examine the consequences of questionnaire length, number of attributes, and number of alternatives on choice experiment responses to a mail questionnaire regarding recreational fishing management of Northwest Atlantic groundfish. By comparing response rates, response types, model parameter estimates, and willingness-to-pay between a controlled base survey and different variations on task complexity, this study will discern whether different choice experiment structures induce respondent behaviors that alter response outcomes, and the type and magnitude of such effects.

Economics of Fishing Activities/FA13
Recreational fishing

Does the recreational angler care? escaped farmed vs wild atlantic salmon

ID paper: 256

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The paper explores to what extent escaped farmed salmon from fish farms affect the willingness-to-pay for recreational fishing of Atlantic salmon in Norwegian rivers. The aim is to quantify the potential externality from escaped farmed species working through the demand for the natural stock of congeners. While the biological and genetic effects of escaped farmed salmon have been widely acknowledged, the potential economic consequences have received little attention. This study is a first attempt to close this gap by analysing the direct effect on the recreational use values. The empirical analysis is based on the results from a contingent valuation survey conducted in Norway. It is found that the presence of escaped farmed salmon in Norwegian rivers may have severe economic consequences on the willingness-to-pay for recreational fishing.

The recreational fishing story a role for the economist because conventional biological and effort restrictions are not enough

ID paper: 433

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Many of Australia s most valuable fisheries are not appreciated as such and so have miniscule management budgets. This situation is considered to be common elsewhere too. The paper argues this situation needs to be addressed from both scientific and community perspectives, but is ultimately doomed to fail unless the political and economic aspects are fully appreciated and addressed. The paper explores why community fishing policy in Australia as elsewhere lacks rigor from the social, legal, economic and environmental perspectives. Such fisheries are undermanaged and so under-resourced - almost everywhere despite being politically and economically very important. Politicians and fishery managers have yet to come up with really successful win-win strategies which are both widely accepted and widely adopted. This paper looks at some of the political and community constraints and proposes some really simple workable fisheries management solutions which satisfy fundamental economic and societal? - principles. The paper uses both Australian/New Zealand and north American/European case studies to illustrate the key points made.

Is the wealth-based approach really appropriate for small-scale fisheries in the developing world? an alternative perspective

ID paper: 119

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Increasingly, the dominant view in academic and policy arenas is one where the major contribution of capture fisheries to development should be derived from the capacity of society to unlock the inherent wealth (i.e., the resource rent value) of the fish stocks. This is the so-called wealth-based approach . This wealth-based approach has been recently heavily promoted in a number of international fora including: the World Trade Organization, the United Nations, the Global Conference on Small-scale Fisheries, and the 2008 IIFET Conference. Drawing upon empirical experience from the South, we challenge this view. We argue in particular that the major contribution of small-scale fisheries in developing countries does not lie in the rent that they could generate but in their labour buffer function, that is, their capacities to absorb unskilled surplus labour and provide safety net and risk mitigation mechanisms for millions of households in a general context of vulnerability. A very rough evaluation of the global value of this labour buffer function is provided. It suggests that this labour buffer function is probably worth more than US$61 billion per year, i.e. substantially more than what is estimated to be lost in the dissipation of the world fisheries economic rent.

Economics of Fishing Activities/FA14
Contribution of capture fisheries to socioeconomic wellbeing

Consumer surplus in fisheries

ID paper: 405

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Establishing an effective management of former open access fisheries can increase resource rents from close to zero to numbers as high as several hundred Mio $ p.a., as it has been the the case in Iceland's cod fishery. Whenever the corresponding harvesting rights are given out free of charge as in the commonly applied grandfathering approach, these resource rents constitute a significant producer surplus. The effect of management on consumer surplus has been studied to a much lesser extend. In this paper we derive conditions on the natural dynamics of the fish stock, harvesting costs and consumer preferences under which consumer surplus under effective management is lower than in an unregulated fishery. This potentially gives rise to an additional distributional problem in managed fisheries with grandfathered ITQs, as they may generate revenues for ITQ holders not only by increasing the efficiency of the fishery, but in part also by shifting welfare from consumers to ITQ holders. We conduct a bioeconomic modelling analysis of how the fisheries transformations from open access (OA) to maximum economic yield (MEY) management affect consumer surplus. First, we compare the open access with the MEY equilibrium and derive conditions under which consumer surplus under MEY management is higher or lower than under OA. Second, we study the effects on consumer surplus during the transition phase from an OA fishery to a fishery that is managed under MEY in the long run.

Poverty analysis in households with fish-based livelihoods strategies in the riverine areas of southwest nigeria

ID paper: 24

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In Nigeria, poverty is a nationally endemic problem that is more pronounced in rural areas especially those with extenuating locational difficulties. Poverty in Nigeria is also characterized with occupational dimension as the poor are mostly involved in primary production especially agriculture. The poverty situation for households in which livelihoods depend on proceeds from wild or farmed fish production or a combination of both has been largely left unexamined. This is however necessary because despite NEPAD s campaign for and incentives to producers for increased fish production, only very few artisanal fisher folks have responded by diversifying into commercial aquaculture. This study analyzed poverty among artisanal fishers, fish farmers and those combining the two. Primary data collected by means of pre-tested questionnaire were analyzed using descriptive statistics, t-test, Foster-Greer-Thoberke (FGT) and Tobit Regression models. The t-test showed that there were significant differences between revenue from households involved both in artisanal fishing and aquaculture on the one hand and those exclusively involved in either aquaculture or artisanal fishing. The incidence, depth and severity of poverty were lowest in households combining artisanal fishing and aquaculture. The Tobit Regression model isolated correlates of poverty for policy attention. Measures to combat poverty in each fish-based livelihood strategy were recommended based on empirical findings.

Economics of Fishing Activities/FA14
Contribution of capture fisheries to socioeconomic wellbeing

Value-driven rent dissipation in limited-entry fisheries: experimental evidence

ID paper: 468

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Economists have devoted considerable attention to rent-dissipation in limited-entry fisheries as a result of excessive use of capital inputs, or "capital stuffing." We may refer to this mechanism of rent dissipation as "cost-driven rent dissipation." An alternative potential mechanism of rent dissipation, which we refer to as "value-driven rent dissipation," may occur if limited-entry management causes fishermen to receive a lower price for their fish than would be possible under an alternative management system. In theory, value-driven rent dissipation may occur if the marginal value to a fisherman from fishing differently (for example, more slowly to take better care of the fish and improve quality) is positive but less than the marginal cost from a reduced catch share. This paper describes an economic experiment to study value-driven rent dissipation in a limited entry fishery. Following an approach developed by Knapp and Murphy (2010), subjects "fish" competitively for beans by scooping them out of a large bowl and "delivering" them to a bucket. Given the choice of delivering to a bucket placed close by for a lower price or a bucket placed farther away for a higher price, unless the price differential is sufficiently high, subjects choose the closer but lower-priced bowl. With the introduction of an individual quota to replace the competitive fishery, value dissipation ends as subjects choose the higher-priced bowl. This simple experiment provides a powerful demonstration of a less-appreciated mechanism of rent dissipation, which is useful for both research and teaching.

Food security through aquaculture development: Lessons from Bangladesh and Malawi

ID paper: 173

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Small-scale aquaculture is fundamental to the livelihoods of many of the rural poor in Asia and Africa. There is growing evidence that in many cases the poorer people have the greater dependence on aquatic resources, particularly low-value fish and non-fish aquatic resources. However, in spite of the benefits, the potential of aquaculture for rural development and poverty alleviation is often overlooked by national authorities and international development agencies. The reasons include its often informal, small-scale nature and part-time activity. Limited availability of production, income and employment data exacerbate this underestimation. Taking examples from Bangladesh and Malawi, this paper examines the impact of aquaculture development on poverty alleviation and food security from the standpoint of its impact on employment, income and household consumption and nutrition. The analysis shows a positive impact of aquaculture development on employment, income and consumption. The paper concludes that it will pay-off if national policies in their medium to long-term plans are geared toward increasing the production of fish from aquaculture. Such policies will, however, need to concurrently address the food security and poverty questions more sharply than that has been done at present by increasing institutional and infrastructure support for diversification of production targeted to resource poor households.

Economics of Fishing Activities/FA15
Contribution of capture fisheries to socioeconomic wellbeing

Worldwide returns to fisheries management expenditures

ID paper: 401

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The UN Law of the Sea of 1982 assigned rights and responsibilities to the fishery resources within 200 nautical miles of the coast (i.e.,the Exclusive Economic Zones: EEZs) to the adjacent maritime countries. A key responsibility is the requirement that these countries manage their marine living resources sustainably through time for the benefit of both current and future citizens of the world. As a result, many maritime countries spend a substantial amount of money managing the fishery resources in their EEZs. However, there is widespread overfishing in the waters of many countries. We investigate, at the global level, how effective these management expenditures are in terms of achieving sustainable fisheries, To address this problem, we combine two global fisheries data sets. The first is the Sea Around Us/Fisheries Economics Research Unit s subsidies database, which contains estimates of the amount of money spent by all maritime countries to manage their fisheries. The second is worldwide information on the exploitation status of different species of fish within EEZs determined by analyzing catch data reported in the Sea Around Us database. With these two datasets, we are able to carry out a cross-sectional Generalized Linear Regression analysis to test the hypothesis that management expenditures are effective in maintaining sustainable fisheries. In the analysis, we control for differences in economic development, the absolute size of fishery sector among other socioeconomic and stock-related variables. By focusing on fisheries at the global scale, we provide insight into the effectiveness of fisheries management that is difficult to reach from smaller scale studies.

Tragedy of the commons and international trade: case of international fisheries

ID paper: 348

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In the globalizing era, world trade of fishery resources has sharply increased. Because capture fisheries are hard to be managed, growing opportunity for fishery trade may cause the overexploitation of world fishery resources. For instance, the theoretical model developed by Takarada et al (2009, mimeograph) implies that fish stocks may be overexploited when they are traded. In our paper, we examine empirically the effect of trade on the exploitation of fish stocks. The empirical framework is based on the model of McWhinnie (2009, J. Env. Econ & Man 57.3), and we extend her model to examine the relationship between exploitation and fishery trade, instead of internationally sharing. The empirical results by using disaggregated data of fishery trade in EU (HS 6-digit level) and exploitation information by FAO and Sea Around Us Project imply that the fish stocks are likely to be overexploited when they are traded. These results, which are consistent with the theoretical consequence by Takarada et al., suggest that fishery stocks should be more effectively managed to prevent overexploitation.

Economics of Fishing Activities/FA15
Contribution of capture fisheries to socioeconomic wellbeing

Contribution of children in artisanal fisheries to poverty alleviation in ondo state nigeria

ID paper: 104

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Despite the global impetus for the eradication of child labour in agriculture, children in developing countries continue to be prominent actors in the fisheries sector. Though their contribution goes unnoticed in many national statistics, their involvement is alleviating poverty of fishing households. The study examined the contribution of children involved in artisanal fisheries to the economic welfare of their households in Nigeria. Simple random sampling procedure was used to select ninety children aged 5-18 years involved in artisanal fishery in Ondo state. Descriptive statistics like frequency tables and charts were used to present the findings of the study. Pearson product moment correlation and the chi square analysis were used to test the significance of the study hypothesis at the 0.05 level. Respondents were mostly males (70%) with mean age of 15 ± 2 years. Fishing experience for two-thirds was over 7years. Major economic activities were fishing (100.0%) and fish marketing (97.8%). All respondents fished more on rivers with friends mostly in the mornings (70%) between 4-5am (43.3%). Mean daily catch amounted to N317 ($2.49). Respondents major constraint was lack of capital to purchase nets and boats of their own (97.8%). Income increased significantly with age of children ($r = 0.27$, $p< 0.05$). Sustainable involvement of children in artisanal fisheries can help alleviate poverty. Children s capacity for production should be boosted through training and provision of fishing equipment. Keywords: Children, Involvement, Artisanal, Income, Sustainable

The need to clarify fisheries economics

ID paper: 408

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Recent articles in the multidisciplinary fisheries literature have been critical of fisheries economics concepts and literature. For example, a paper by Bromley (2009) entitled Abdicating Responsibility: The Deceits of Fisheries Policy : Fisheries 34(6):280-302, provides a critical review of fisheries economics. I explore the main issues raised in this paper and come to the conclusion that there is a need for fisheries economists to be much more careful and clearer in communicating our ideas. I will present how we can begin to do so in this talk.

Economics of Fishing Activities/FA16
Contribution of capture fisheries to socioeconomic wellbeing

Assessing vulnerability in small-scale fishing communities

ID paper: 107

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In fisheries, the conventional perception conveyed by the literature is that fisheries and rural poverty are intimately correlated. This particular view has, however, been recently disputed by several authors who argue that fisherfolks are not necessarily the poorest of the poor in monetary terms, but may, instead, be amongst the most vulnerable socio-economic groups, due to their particularly high exposure to certain natural, health-related or economics shocks and disasters. Unfortunately very little information exists that would allow scholars and policy-makers to acquire a better understanding of these issues. In this paper we present the results of an integrated framework developed to assess and compare various sources of vulnerability affecting livelihoods of rural communities in a participative manner. The framework was tested in two fishing communities in Mali and Nigeria. The analysis reveals some counterintuitive results. Despite fishing being the primary livelihood, vulnerabilities relating directly to the state of the resource were ranked lower than those relating to basic human needs such as health or food security. Those results challenge the conventional view in fisheries science and suggest that non-sectoral development interventions can have more effective impacts on the livelihood and vulnerability of those communities than interventions targeting the resources. The paper discusses the implications of these empirical results.

Global tuna demand, price response and management: a summary of global tuna demand workshop in la jolla, ca on may 13-14, 2010

ID paper: 434

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Paper scheduled to present in the Special Session: Global economics of tuna fisheries Knowledge of global demand and price responses is required to understand and predict the impact of international tuna conservation and management measures of the economics of the global tuna fishery. If the demand is inelastic, decreases in landings can increase revenues. Identifying the strength of this relationship would provide convincing evidence that conservation through reduced catches not only lowers costs but raises revenues and hence profits and resource rent. If the demand is elastic, there is no incentive for fisherman voluntarily to reduce their landings which would lead to reduce their revenue. Under this circumstance, a quota trading mechanism would be needed to provide fishermen the capability to adjust their operation in an optimal economic scale to help conservation through reduced catches. The Inter-American Tropical Tuna Commission (IATTC) and NOAA Fisheries are convening a workshop in May 13-14, 2010 to focus on both economic and biological system research to enhance the conservation and management of highly migratory tuna resources through an incentive-based management approach. The workshop will identify the most promising areas of inquiry and action, and set priorities for further research. This workshop brings together scientists from the major fishing nations, Regional Fishery Management Organizations (RFMO), NGOs, and other involved parties to review current tuna purse-seine and longline fleet dynamics, global tuna markets, and management strategies of the EPO. Price responses to the tuna sashimi market in Japan and tuna raw material cannery market in Bangkok is also evaluated. A quota trading mechanism would be discussed to provide fishermen the capability to adjust their operation in an optimal bio-economic way to help conservation through reduced catches. The outcomes of the workshop will be summarized and communicated with the interested public to ensure the result from this workshop will serve regional and national outreach efforts. This is made possible by bringing together key industry players and policy makers from both the IATTC coastal state members and the distant water state members. The results will not only be useful for the IATTC, but also in the broader international arena. Wide dissemination will improve public understanding and involvement in stewardship of tuna resources.

Environmental and socio-economical impacts of the peruvian anchoveta supply chains: work plan and first results

ID paper: 141

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The Peruvian anchoveta fishery (the largest mono-specific fleet worldwide) supplies mostly a chain of fishmeal and fish oil aimed at producing animal feeds, mostly in other continents, whereas others supply chains for direct human consumption only use

Lessons from reform of Peru's anchoveta fishery

ID paper: 443

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The World Bank has fostered introduction of an individual quota management system in the world's largest fishery based on both economic and social studies. The implementation of the quota legislation has uncovered a range of issues which were largely foreseen but fall outside the remit of the fisheries authorities. The paper focuses on these judicial, social and distributional issues with an emphasis on process and the political economy of reform.

Generating and sharing resource wealth in the Senegalese deep-water shrimp fishery: how to build a win-win public and private partnership (PPP)?

ID paper: 462

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In Senegal, macroeconomic and fishery sector policies stress sustainable wealth creation for poverty alleviation. However, the current fisheries management system is incapable of achieving this objective. The most valuable fish stocks are over-exploited with excessive fishing effort and capacity and no sustainable resource rents are being produced. Policy reform has started with the design and implementation of a fishery management plan for the deep-water shrimp fishery. A participative process has proposed a new strategy and a revised institutional framework for the management of the fishery with a focus on the resource wealth (resource rents). A preliminary stage was to estimate rents using bio-economic modelling so as to clarify the stakes and the need for reform and generate understanding and support amongst stakeholders. A central feature of the plan is the creation of a private Fishery Management Organisation (FMO) involving all the companies operating in the fishery. The allocation of collective exclusive fishing rights to this organisation is based on the historical catch performance of the fishing companies. A Public-Private Partnership is being established (as a concession) between the Government and the FMO. The concession establishes the rights and responsibilities of each party. The FMO is responsible for the operating cost of the future management system. More importantly, the key issue of generating resource rents and sharing them between the Senegalese government and the private sector is a key part of the long term concession granted by the Government to the FMO. Fiscal arrangements are being developed to achieve appropriate sharing.

Economics of Fishing Activities/FA17
Contribution of capture fisheries to socioeconomic wellbeing

Welfare effects of fisheries boom in lake victoria

ID paper: 312

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Trade liberalization is generally seen as an instrumental aspect when poor countries manage to generate economic development. In the 1950s new predatory fish species were introduced in Lake Victoria in order to increase fish availability for human consumption. Particularly Nile perch (Lates niloticus) experienced rapid growth in landings and in the 1980 s and 1990 s international markets were opened for fish exports and policies to facilitate trade were implemented. However, open-access fisheries may be depleted, a risk that is reinforced with increasing exports. The net benefits of opening up Nile Perch fisheries to free trade may have been smaller, and fallen into the hands of fewer, than if the same process had occurred in a developed country. Consequently, the question of whether the welfare of local populations has improved or not is still under debate. This paper considers the effect of the boom in fish export from Lake Victoria on the welfare of the Tanzanian residents who reside in the surrounding communities. We test the hypothesis that as the result of increased Nile Perch fish exports from the Lake, the magnitude and intensity of poverty did not decline and it may have increased. We also explore whether the increased fish export has influenced the food intake among households near the lake. We use the 1993 World Bank survey in Tanzania and a replicated survey of 500 households in regions Mwanza and Mara (Lake Victoria area) to test these hypotheses.

Political economy lessons for fisheries aid

Fisheries aid (Short title)

African Fisheries Development Aid: Country Case-Study (1): Ghana

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Ghana is presently under a constitutional multi-party democratic unitary government and the country has survived years of military rule from mid sixties to early eighties. Ghana's Fisheries sector presently contributes significantly to national socio-economic development objectives relating to food security, employment, poverty reduction, GDP contributions, and foreign exchange earnings. The fisheries sector which is expected to play a major role in poverty reduction is plagued by a myriad of challenges including declining marine and Volta lake fish resources amidst poor fisheries protection and management. This trend is not sustainable in the long term; if it continues the resource will in the long term collapse. This study analyses desk information supported by interviews of relevant national stakeholders for useful information on fisheries aid in Ghana. In addition information on fisheries projects have been sought from prominent donors such as the World Bank, JICA, DFID, and FAO. Foreign assistance to the fisheries sector over the years has been minimal and woefully inadequate. The handful of fisheries aid included the FSCBP, IDAF, and SFLP Pilot 1. A remarkable percentage of such development aid ends up accruing back to donor countries and their nationals through consultations, technology provision and equipment supplies. Fisheries aid to Ghana has not resulted in increased profitability of the sector. Overall, mainstreaming of management efforts in the sector has been a major challenge thus the necessary impacts of project assistance easily erode away in no time. There is therefore a critical need for demand driven donor assistance that will help arrest, especially declining fish stocks and therefore improve the contribution of the sector to poverty alleviation. Currently, there is no direct foreign assistance in the fisheries sector. Further investment in the fisheries sector will therefore support government's policy direction of poverty reduction as enshrined in the Ghana Poverty Reduction Strategy (GPRS) and other development plans. A *SWOT* analyses of the fisheries sector identified areas that need immediate fisheries assistance. The other sectors of the economy especially the crops sector have continued to benefit from international assistance. Currently, there are over 30 development partners investing in Ghana including financial institutions and national governments. To help address more forcefully development issues in the fisheries sector, the government has formulated a yet to be launched fisheries and aquaculture policy in 2008 that broadly provides guidelines for fisheries exploitation, production, and development. The goal of the fisheries sector is to establish the long term sustainability of the fisheries resources and thereby maximise its contribution to the economy, to achieve accelerated and healthy capture fisheries and aquaculture.

African Fisheries Development Aid: Country Case Study (2): Senegal

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This document aims to elucidate the factors underlying the formulation of the tools used in ODA policies, the responses to the inefficacy of ODA and its perverse impacts in the fisheries sector in Senegal. The history of the sector in Senegal shows that its current state of development is essentially the product of past expansionist economic policies based on significant technical and financial support, both bilateral and multilateral. Hence, fishing had a key role in the Economic and Financial Recovery Policy (PREF) implemented by the Government in the early 1980s. During the period covered by the “PREF” (1980-84) the fisheries sector grew at an average 3.8% per annum. Fishing GDP grew very fast: 17% per annum in current francs (4% in constant francs). This growth is remarkable when compared to that of the primary sector (12% and 1%). These policies were carried out in a context of fish resource abundance, without worrying about their limited nature. Nowadays, the once abundant fish resources are either fully exploited, overexploited or in decline. Nonetheless, the State and its technical and financial partners have continued their policy of sectoral support. Projects and programmes have been started and implemented in order to correct the management system and to enable sustainable and rational resource exploitation. Others have been implemented in order to increase supply capacity. This study seeks to improve understanding of the sector's situation and to clarify the factors responsible for the success or the failure of development policies and tools. Some light will also be thrown on sectoral support, its relevance, quality and achievements. Finally, this work will highlight the new economic vision guiding the management of key fisheries and the projects and programmes which underpin this new approach. It is concluded that It is clear that poorly-formulated projects and programmes are responsible for persistent problems and needs in fisheries development. Sectoral issues are rarely taken into account in the formulation phase and therefore the results that are achieved by programmes and projects do not correspond to the real development needs of the sector. Without any doubt, there is a strong external will to support fisheries development activities, as shown by the design and the implementation of large scale projects and programmes together with greater and greater resources. Yet, despite the efforts provided and the resources mobilised, these projects and programmes lead to very few changes. The responsibility for this situation is shared: the State does not recognise its poor investment choices, and nor do the development partners.

African Fisheries Development Aid: Country Case-study (3): Uganda

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The fisheries sector is of high importance for the economy of the landlocked country of Uganda, East Africa. Over the last 10 years, fish has taken a strong position in the country's export earnings with a dramatic increase since 1991 from 4,751 tons to 31,681 tons in 2005 to the international market. Exports have, however, since reduced, due to lower catches of Nile perch due resulting from use of illegal fishing gears/methods and catching of immature fish, although regional trade remains important and aquaculture fish production is on the increase. Development assistance has been provided to Uganda to support the improved management and productivity of fisheries for at least the last 30 years. This report reviews the nature and performance of fisheries management projects between 1976 and 2009, with particular focus on projects since 1997, and identifies factors that may have contributed to areas of poor performance, particularly in the long-term sustainability of project-related impacts. It was found that evaluations of many of the projects identify very positive outcomes, but highlight concerns about long-term sustainability, as well as some areas of poor performance, particularly substantial delays in procurement and release of counterpart funding by the Government of Uganda. The generally inadequate level of funds allocated to the fisheries sector by government, including very limited funds at the local government level, and the frequently short duration of support from donors, were factors contributing to limited sustainability and impact of outcomes. The inability to develop sustainable financing mechanisms within the sector, despite the potential to do so, has further limited the long-term sustainability of management and development approaches and initiatives. Three projects within the last ten years have included efforts to address fisheries management challenges informed by economic analysis. The report concludes with a review of the outlook for the sector, highlighting the need for more support in a range of key areas including increasing compliance, particularly through co-management approaches, strengthening policy and legislation, capacity building throughout the sector, support for developing greater financial sustainability of management, promotion of aquaculture and support to develop and implement a National Plan of Action for Managing Fishing Capacity on Lake Victoria, in line with the RPOA-Capacity.

Fisheries management

A multivariate poisson approach to estimating target catch and bycatch production

ID paper: 77

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This paper develops a count data model of target species and bycatch production for an arbitrary number of species that handles correlation between species and over time. The model is applied to a large observer dataset for fishing trips taken from 1990 to 2008 for roughly 150 vessels participating in the California/ Oregon drift gillnet fishery. The fishery targets swordfish and thresher shark and produces leatherback turtle and marine mammal bycatch. Bycatch in commercial fisheries is an unwanted output which is commonly regulated by conservation measures such as quotas or time-and-area closures that directly impact the status and production of the associated fishery. Set level production is modeled within a multiproduct production system framework as conditionally dependent on temporal, spatial, technological, environmental, and regulatory explanatory variables. The model is empirically estimated utilizing the multivariate compound Poisson estimator with set level data to estimate the impact of explanatory variables on the rates of target species and bycatch production within the fishery. Empirical results suggest a statistically significant relationship between set and vessel level characteristics and production rates of target species and bycatch. The rare-event risk for protected species bycatch indicates that conservation measures to further reduce bycatch from current rates may have a statistically significant opportunity cost of target species production.

Fisheries management/FM01
Bycatch, discards, selectivity

Managing technical interactions in an ecosystem: confronting bycatch limits in a closed fishery

ID paper: 252

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Area management of the U.S. scallop fishery is one of the few management successes in the Northwest Atlantic, averaging 24,000 mt per year from 2000-2007 under area management compared to 9,000 mt per year from 1950-1999 under other forms of management. Scallops are classified as neither overfished nor is overfishing occurring according to criteria in the Magnuson-Stevens Act with an estimated stock size of 1.5 times Bmsy. Since 1999, the Georges Bank closed area scallop fisheries have been subject to common-pool total allowable catches (TAC) for scallops and yellowtail flounder bycatch. The yellowtail bycatch TAC has often forced early closure of these fisheries. For the 2009 scallop fishery in Closed Area II (CAII), we conducted a fine-scale Peterson tagging study that estimated yellowtail stock in CAII. We overlaid the flounder spatial distribution with scallop spatial distribution to produce a high resolution map showing densities of both species by area and sent the map to scallop vessel owners before the area opened to facilitate avoiding areas of high yellowtail densities in order to harvest the full scallop TAC. The yellowtail bycatch shut down the fishery early, leaving ½ of the scallop TAC on the ocean floor. We examine the results of this experiment, including the effects of differing estimates of stocks in CAII, errors in estimating bycatch from observer data, delays in reporting estimated bycatch to captains, biological implications of unharvested scallop TAC, and the economic impacts of early closure of the fishery.

By-catch management in itq fisheries

ID paper: 269

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New Zealand s quota management system is based on transferable harvesting rights operating within regulated allowable harvest limits. The system has evolved since its implementation in 1986. One particular challenge has been the design of mechanisms to encourage the balancing of catch against quota. A model is developed for a target and by-catch fishery where managers can control overharvest using a regulated limit to harvest and a fiscal instrument, or penalty, that attaches to harvesting without the necessary right to cover the catch. The optimal penalty that attaches to the by-catch is found to be equal to the sum of the price of by-catch harvesting rights and the by-catch shadow value. New Zealand has adopted a system of deemed values to encourage fishers to balance their harvest against their quota rights. We use time series data for two fisheries, a target species (alfonsino) and a by-catch species (bluenose), to test the relationship between the annual price of harvesting rights and deemed values. Deemed values are found to influence quota prices in two of the four fisheries studied. A vector autoregressive model is used to highlight the need to regularly review deemed values. The data also reveal a pattern of within season behavior where fishers pay interim deemed values and balance their harvest at the end of the season using rights purchased in the market.

Fisheries management/FM01
Bycatch, discards, selectivity

Growth overfishing

ID paper: 362

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Growth overfishing is increasingly seen as a serious problem, squandering large parts of the natural growth potential of fish stocks, but also leading to increased variability in abundance and other -- potentially irreversible -- ecological consequences. Nevertheless, it has received little attention. In particular, gear selectivity is an important control variable which has been largely overlooked in the economic literature. In the present paper, we derive optimal and non-cooperative exploitation paths for a generic age-distributed resource in equilibrium. In the case of perfect selectivity, competition between two agents is sufficient to dissipate all rents. Akin to the classical Bertrand competition in prices, each agent has an incentive to target fish at a younger age. Hence, the "race to fish" extends to the dimension of age. This observation is crucial also with respect to management: Individual quotas are not able to restore efficiency if not accompanied by gear regulation. Moreover, it makes a difference whether quotas are specified in terms of value, volume or numbers. The same is shown to hold true in a model formulation where only the first and last age at capture can be controlled separately from the fishing intensity. A numerical simulation modeled after the Barents Sea cod fishery exemplifies the effect of this "fishing down the age-structure".

Compensatory mitigation: an alternative solution to seabird bycatch in fisheries?

ID paper: 299

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The concept of compensatory mitigation is well established as an approach to environmental management. In the past, mitigation programs have been used to conserve wetlands affected by development, and is proposed as a cost-effective approach to offsetting greenhouse gas emissions through reforestation programs. The concept may be equally applicable to environmental management in fisheries. Each year, substantial numbers of non-target species are caught and killed as incidental bycatch from fishing. Of increasing concern is the impact this bycatch is having on seabirds. Substantial areas of fisheries are being closed to protect these species at great cost to the fishing industry. However, other actions may be taken to offset the impact of fishing on these populations, such as reducing predation by invasive species. In this paper, we examine the potential role of compensatory mitigation as a fisheries management tool. An example is provided of the potential cost effectiveness of rodent control relative to area closures for the conservation of a seabird population adversely being affected by an Australian tuna fishery. We find that, in the example being examined, invasive rodent eradication is over 40 times more cost effective than area closures.

The economics of discarding in the new zealand fisheries

ID paper: 294

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Amounts of commercial fish discarded vary from country to country based on the level of enforcement, the fishery management system in place and the incentives/ disincentives it creates. A study on fish discards by FAO in 2005 pointed out the paucity of data on commercial fish discarded in New Zealand. Without reliable data we cannot know the extent and impact of discards. Although the New Zealand fishing authority (The Ministry of Fisheries) acknowledges the potential damaging effects of discards on sustainability assessment, the level of enforcement addressing this issue and the associated penalties varies by fisheries. With the introduction of the Quota Management System (QMS) in 1986 and later the development of an Individual Transferable Quota (ITQ) market, the enforcement activity has, to a great extent, been shifted from the enforcement of input restrictions (access, area, season, gear) to the enforcement of output restrictions (catch volumes) in the form of the individual quota constraint. This requires the monitoring of individual catch volumes and the balancing of those with Annual Catch Entitlements (ACE). At the end of the fishing year, fishers must pay a deemed value (DV) to the fishing authority for the proportion of catch not covered by ACE. While a DV payment is usually set above the going ACE price, it is not prohibitive for most QMS species. Although this mechanism created a financial incentive for fishers to attempt to cover any ACE deficiencies as the fishing year progresses, it often fails to generate the intended incentive to report and land any unwanted fish. Discarding of commercial catch usually comes from a disconnection between fisher s behaviour and any effort by the resource managers to promote incentives not to discard. Within such context, this paper discusses the forces at play which influence discarding behaviour in New Zealand. We identify potential causes and effects in the current system that may influence such behaviour. We find that incomplete structured property rights could be blamed in part for the discards it generates where ITQs and ACE represent more a property right of the resource flow rather than of the resource stock itself. Because, discarding of particular species may be a suitable outcome from the fisher point of view when seeking profit maximisation, we can estimate individual s optimal discard rates within fisheries using constrained optimisation techniques. We present the underlying analytical model and discuss its parameterisation. We then show that incentive to discard is affected not only by catchability coefficients and relative prices of the species but also by DV rates and ACE availability and prices. We then extend the model to contrast alternative management schemes by creating additional market mechanisms such as a DV rate specific to unwanted fish, pseudo-ACE prices and taxes that could be used as incentives to control the level of discard. We also contrast the current situation with alternative management decisions, for example if enforcement were to be increased. Finally drawing upon the model findings, we present our recommendations according to different management scenarios.

Ecosystem-wide impacts of alternative bycatch reduction strategies: an ecological-economic assessment of the Australian Southern and Eastern Scalefish and Shark Fishery

ID paper: 303

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A concern for the consequences of bycatch and discards in fisheries has spurred the implementation of new policies and fisheries management plans aimed at their reduction in many fisheries around the world. Such plans have been developed for the Australian Commonwealth fisheries (most recent bycatch action plan extends from 2009 to 2011 for this case study). These include a wide variety of species, including both commercial fish and non-commercial species, particularly those listed as threatened, endangered or protected. This paper presents an analysis of the potential economic and ecological impacts of alternative approaches to the implementation of these plans, with particular emphasis on the use of economic incentives to reduce bycatch and discards. The analysis is centered on the Australian Commonwealth Southern and Eastern Scalefish and Shark Fishery, and is based on the Atlantis simulation model developed within CSIRO. Atlantis is a spatially explicit model with sub-components that model the coupled physical transport-biogeochemical processes as elements of the ecosystem, as well as sub-models to include the fisheries, the annual assessments, and the implementation of management regulations and compliance. A feature of the Atlantis model is that it incorporates a fleet dynamics model that allows the main fleets to adjust their fishing behavior in response to the incentives. Incentive-based bycatch management scenarios such as the use of deemed values within the existing tradeable quota scheme for over-quota landings, or the imposition of a tax on catches of threatened, endangered and protected species, are considered. The consequences of these scenarios are presented in terms of both ecological and economic impacts, with a focus on the ecosystem-wide implications of alternative regulations.

Incentive-based management of bycatch: using quota markets to conserve seabirds

ID paper: 300

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Despite substantial technological developments over the last two decades, incidental catch of charismatic species occurs in many world fisheries. In some cases, populations of these species are at low levels, and in several instances the species have been listed as endangered or threatened under national conservation legislation. However, the lack of any cost to fishers associated with declining bycatch populations and the free rider problem associated with any environmental restoration process result in no incentives for the fishing industry to undertake other population restoration measures. In this paper, the potential for bycatch quotas to provide an incentive to minimise bycatch of seabirds is examined. An Australian fishery with incidental bycatch of seabirds is used as an example to illustrate the principles. For a bycatch quota to be successful, the potential for targeting and/or avoidance behaviour is essential, and this is examined using an output distance function approach. Both advantages and challenges for the development of such a system are considered, as well as its applicability to other fisheries with bycatch of threatened species.

Fisheries management/FM02
Bycatch, discards, selectivity

Market-based size selection in the Bering Sea pollock fishery

ID paper: 425

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For every fish species, future potential harvests are impacted by current catch levels and patterns. Traditionally, managers use regulations on gear (e.g., mesh size) to control so-called growth overfishing. Such regulations are likely economically inefficient due to increased search costs and lower catch rates. Bioeconomic models typically evaluate efficiency for the fleet as a whole (e.g., Gates 1974, Thunberg, Helser, and Mayo 1998, Eggert and Ulmstrand 2000). Here we propose that optimizing a fishery should focus instead on individual vessel operator behaviors. That is, vessels targeting young fish impose an externality on the rest of the fleet, meaning that the stock costs are born by the fishery as a whole rather than the individual vessel. In a fishery with observer data on fish size, a fee or quota adjustment can eliminate the externality that vessels impose on other members of the fleet in choosing to fish on less-than-optimal aged fish. Unlike gear restrictions, this allows vessels to catch younger fish when the cost of avoiding them is larger than the future benefit to the fish population. Here we conduct a retrospective analysis to explore the potential impacts of providing quota and fee incentives to the pollock fishery to target fish of different age classes.

Hooker s sea lion bycatch in New Zealand

ID paper: 124

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With a value of NZ$ 85 million the seasonal squid fishery represents one of New Zealand s main export earners. The majority of catch is taken by trawl from the Auckland Islands, 350 km south of New Zealand, which coincides with the main breeding and foraging range of the rare Hooker s sea lion. Currently the government constrains the incidental capture of sea lions by closing the seasonal fishery once a specified number of sea lion deaths is reached. This results not only in significant financial losses but also provides an incentive to fishermen to circumvent regulation, i.e. the calculated number of sea lion deaths is based on an estimated mortality rate per standard unit of effort but recently trawl vessels are observed to expand the capacity of such a standard unit. This paper formalises the current situation analytically by constructing a bioeconomic model that captures the idiosyncracies of the squid fishery and the imposed regulation. By reducing the regulatory constraint to a simple isoperimetric problem I am able to show analytically how the current management regime leaves fishermen with no avenue other than to increase the capacity of a standard unit of effort in order to increase profits. I suggest an alternative management approach where the government may place a fee on each unit of effort as a function of the radial distance to the Auckland Islands. By internalising sea lion bycatch as a space-dependent cost whilst still retaining the regulatory mortality limit, the incentive for fishermen to increase profits is redirected to the choice of distance from the sea lion s breeding grounds.

Protecting marine mammals in the U.S: Tradeoffs between public and private costs

ID paper: 494

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Implementation of the U.S. Marine Mammal Protection Act (MMPA) generates costs to both the public and private sectors. While many of the costs are complementary, some result in potential tradeoffs between various groups incurring these costs. Under the MMPA, if estimated bycatch of a species exceeds its Potential Biological Removal (PBR) level, a plan must be developed to reduce bycatch below PBR. Most of the costs associated with such a reduction are borne by private entities (e.g. fishermen). The determination of PBR includes a minimum population level (NMIN), which is a function of the best estimate of the population level (NBEST), and the coefficient of variation (CV) associated with NBEST. Publicly funded abundance surveys are used to derive the values for NBEST and its CV. Survey costs reflect the spatial and temporal scale of the survey and its frequency. Compared with a high cost survey, a lower cost survey can result in a lower value for NBEST with a larger CV, yielding a lower PBR value. Alternating high and low cost surveys may result in substantial changes in PBR estimates. This study compares the cost of a marginal gain in precision of NMIN from an abundance survey with the costs imposed on the fishery and government to reduce bycatch, using harbor porpoise (Phocoena phocoena) and the U.S. Atlantic coast sink gillnet fishery as an example.

Optimal management of conflicting species:Grey Seal (Halichoerus grypus) and

ID paper: 306

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Conservation goals and resource use can easily conflict when externalities exist. This is the case in the Baltic Sea with grey seal (Halichoerus grypus) and Atlantic salmon (Salmo salar). Both of the species have been defined as critically endangered in the late 20th century but due to conservation schemes, harvest controls and enhanced environmental quality the situation of both species has ameliorated. Grey seal population has been growing quickly after 1980s and is now regarded as near threatened whereas salmon is still regarded as endangered. The disadvantages towards the professional fishing have been growing along with the increasing grey seal population in the Northern Baltic. Catch losses (eaten and injured fish) and broken fishing gears have been identified as the most common seal induced damages to the fishery. Fishery, however, poses a threat to grey seals that are caught as by-catch. To these ends, we construct an age-structured bioeconomic model accounting for both species. The model observers commercial and recreational salmon fisheries and the damages caused by seals especially to commercial fishery. Further, the model accounts for the non-use and potential use value of increasing seal stock. Numerical methods are used to solve the socially optimal number of seals and optimal harvest allocation between commercial and recreational salmon fisheries.

Fisheries management/FM03
Bycatch, discards, selectivity

Towards development of biological-economic evaluation tool in fishery policy: Cost-effectiveness analysis of protecting species in a multi species fishery

ID paper: 143

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The paper argues that Cost-Effectiveness Analysis (CEA) can be a suitable evaluation tool in cases where some of the benefits are difficult to measure (e.g. habitat protection) and where the tangible benefits are lower than the cost. An example is polities aiming at protecting a single species in multispecies fisheries. The resulting cost-effectiveness ratio gives the cost of achieving a certain objective and can be compared with the willingness-to-pay for the policy, often expressed by the politicians. Implementing more selective fishing technologies with the purpose to reduce discards of juvenile fish and unwanted bycatch has been identified as one of the primary means in rebuilding plans. The paper develops how to measure the effects of selective fishing gears and how to include several effects such as different species or age classes in the analysis. It further evaluates the consequences of the different effect measures on the recommendations from the cost-effectiveness analysis. The paper compares results from two different selective gears implemented to a case study in Kattegat and Skagerrak applying the proposed cost-effectiveness tool. The results points to cost involved in protecting the cod stock and cost-effectiveness ratios around 100 DDK, showing the cost per unit changing stock biomass. Given that a selective gear policy is already in place, the (implicit) willingness-to-pay has been higher than 100 DKK.

Demonstrating the evolution towards ecosystem management in Regional Fishery Management Organizations

ID paper: 162

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In ecosystem-based fishery management, the ecosystem comprises the natural sub-system and also human components, including user groups, institutions and the processes of management. Regional Fishery Management Organizations (RFMOs), particularly those designed to manage tunas, were not established with an ecosystem view of the pelagic environment. However, tuna RFMOs have evolved from an almost exclusive focus on tunas to a broader scope of management that includes many other oceanic resources. This paper reviews critical issues related to the management of billfish, bycatch in tuna fisheries to illustrate this evolution. The paper reviews four components of ecosystem-based fishery management: policy and planning, development, research and management. Ecosystem-based management is affected by many factors including subsidies, conflicting objectives for fishing sectors, shortcomings in catch statistics data, a need for social and economic data, coordination of transboundary resources and livelihood issues, particularly in developing countries. Based upon these factors, tuna RFMOs need to expand their management framework for ecosystem-based fishery management to be successful. Tuna RFMOs need to continue to reduce fishing mortality on species in which overfishing is occurring and also improve the resilience and adaptive capacity of fishers. It is also critical that tuna RFMOs adopt mechanisms to address the increased complexity of ecosystem-based fishery management.

Fisheries management/FM04
Ecosystem based approach to fisheries management

Optimal multispecies harvesting targets in biologically, technologically, and temporally interdependent fisheries

ID paper: 281

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Every fish species is part of a complex ecosystem which competes with other species for resources. Likewise, the harvesting of fish species often involves technological interactions which results in catching multiple species as well as temporal interactions between species as fishermen allocate their effort across multiple fisheries over the course of a year. Ecosystem-based approaches to fisheries management should address both the interactions that occur in the biological ecosystem as well as the larger economic system in which the harvesters operate. Single species management of multispecies fisheries ignores these interactions often to the detriment of the health of the ecosystem, the stocks of fish species, and fishery profits. This paper solves a dynamic optimization problem of maximizing the value from a three species fishery and determines the optimal harvest quota of each species given the biological, technological, and temporal interactions. Using this framework, a multispecies Euler equation, a modified multispecies golden rule, and a multispecies version of the fundamental equation of renewable resources are derived. The model is then applied to the pollock, Pacific cod, and arrowtooth flounder fisheries in Alaska to determine the optimal harvesting quota for each species over time. The population of each species is then simulated into the future with and without each set of interactions to isolate the impact of each type of species interactions on the sustainability and profitability of the fishery. The results highlight the need for including biological, technological, and temporal interactions when determining quota in a multispecies fishery.

Fishing down the food chain: modelling trophic interactions in exploited marine ecosystems

ID paper: 376

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There is increasing concern among fisheries scientists and managers over the ecosystem effects of fisheries exploitation. This concern has been motivated by several publications inferring that the structure of marine ecosystems has been dramatically altered by historical patterns of fishing. Among the most cited studies is the paper by Pauly who concludes that there has been a gradual transition in landings from long-lived, high trophic level, piscivorous bottom fish toward short-lived, low trophic level invertebrates and planktivorous pelagic fish. This effect has come to be known as fishing down the food chain and subsequent papers by Pauly and colleagues have elaborated on the original notion. There is reason to doubt the generality of Pauly s results since the pattern of exploitation of a trophic system ought to be influenced by economic and institutional factors as well as biological factors. Hannesson has shown in a two-species model that the equilibrium ratio of exploitation depends upon price ratios as well as the institutional configuration. This paper develops a model of the fishing down effect in a dynamic four-species trophic model that is a generalization of Vernon Smith s open access model. We examine fishing down the food chain as a dynamic effect, and show that patterns depend not only on prices, costs, and biological parameters, but also on initial entry/exit levels and rates of adjustment of effort. We explore circumstances under which various patterns in the average trophic level of harvest may occur, and we compare indices of harvest with indices of system-wide biomass.

Fisheries management/FM04
Ecosystem based approach to fisheries management

Seafood market-series as fishing pressure indicators for an EAF: a historical multispecies analysis of the São Paulo wholesale market, SE Brazil

ID paper: 397

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The ecosystem approach to fisheries (EAF) challenges the sustainable management of resources at an ecosystem level facing human well-being and environmental health. Here we describe how economic analyses may fill important knowledge gaps for such a challenge when regarding a broader multispecies context, e.g. tracking signals of change in ecosystem and stocks health. Firstly, we show key results of a 40-years trend analysis of almost 100 seafood market categories in São Paulo, a mega city of South America. The annual behavior of ex-vessel prices and market quantities appeared useful as alternative fishing pressure indicators at an ecosystem scale, and were analyzed regarding resources ecological characteristics, such as trophic level (TL), size, longevity and depth. Several multispecies indicators were also tested. The historical trend of total market values showed its maximum in 1989, a period correspondent to fishery landings declining. Such a decline was accompanied by changes in the relative importance of some categories, reflecting shifts also accordingly to their TL, size and longevity. Results appeared to be extremely helpful to test hypothesis of ecosystem change and may prove to be useful in a cost-benefit analysis of management proposals. Secondly, we further elaborate on the significance of seafood multispecies market-series for an ecosystem approach to fisheries (EAF).

Simulating the effect of seasonal fishing moratorium on the fisheries in the Pearl River Estuary coastal ecosystem for fisheries strategies exploration

ID paper: 478

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This study evaluated the effect of the 1999 fishing moratorium on the sustainability of PRE fisheries through an ecosystem approach. Firstly, an Ecopath model of the PRE coastal ecosystem in 1998 was constructed to get a snap-shot picture of the ecosystem before the seasonal moratorium was performed. Then a dynamic model using Ecosim was developed on the assumption that the seasonal moratorium was never applied to the PRE fisheries. And, the attributes of the simulated system without seasonal moratorium were compared with that of the actual ecosystem. Finally, a series of 30 years dynamics simulations were examined in light of four hypothetical scenarios (S) to explore better strategies on the fishing moratorium. S1: continuation of the current state of the fishing moratorium strategy, S2: reducing the fishing effort of the banned fishing gears by 10%, S3: extending the duration of the moratorium (i.e., 1 June to 1 September), S4: listing gillnet as the banned fishing gear. The results show that the hypothetical ecosystem without seasonal moratorium is more deteriorated, immature and fragile than the actual ecosystem. The fishing moratorium did benefit the stock recovery. Comparative analysis among different scenarios indicates that S4 is the optimal approach, which will bring a relatively large (15.8%) increase in the fish stocks with the smallest (4.2%) decrease in landing values. The largest increase (21.0%) in the fish stocks could be obtained in S2. However it incurred greatest decrease (14.8%) in landing values. There seems to be no advisable improvements in Both S1 and S3. This study indicates that the seasonal fishing moratorium should be advocated and encouraged. Banning the gillnetting during moratorium appeared to be potentially applicable compared with other approaches.

Fisheries management under species alternation: case of the pacific purse seiner off japan

ID paper: 180

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In the northwestern Pacific area, the fish alternation phenomena amongst sardine, anchovy and chub mackerel have been observed in every fifty or sixty years. The sardine biomass has been drastically increased in 1930s and 1980s. Chub mackerel biomass has in 1970s, and anchovy has in 1960s and 2000s. It is often discussed that, these phenomenon are presumably as an ecosystem response to the atmospheric and oceanographic regime shift. In order to derive fisheries management theory under these situations, we analyzed the inter-relationships amongst oceanographic index, resource dynamics of the species, economic dynamics of purse seine fishery, and fisheries production (self-sufficiency rate). We found that the intensive capital investment on fishing vessels during the sardine-abundant periods (the 80s) had significantly contributed to the increase in self-sufficiency rate, but became economic burden after sudden declines of sardine in 1990s. In other words, the human decision on trade-offs between economic efficiency and self sufficiency rate has potential effects on species alternation phenomena to be emerged. In order to discuss management options which take species alternation into account, we estimated the effects of hypothetical governmental interventions around the sardine-abundant period (1980s) in terms of fish biomass, economic efficiency, and food supply in the later years, and discussed the trade-offs amongst them.

Fisheries management/FM05
Fisheries & environment

Analysis of the determinants of stock collapse: the case of the american lobster fishery of long island sound

ID paper: 184

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In the fall of 1999, the American lobster population in Long Island Sound experienced a significant die-off. Biologists studying this population attributed the die-off to a period of prolonged high temperatures, which caused stresses due to disease and infection that the lobsters were unable to handle. This explanation ignores the role of anthropogenic factors, notably the potential roles of overfishing due to the open access conditions under which the lobster population is exploited and of nutrient discharges causing hypoxic conditions in the Sound. This paper investigates the relative importance of uncontrollable environmental factors like high temperatures and anthropogenic factors like overfishing and hypoxia in the 1999 die-off. I combine data from annual trawl surveys and lobstermen's logbooks to construct a combined model of lobster population dynamics and fishing effort. I use the model to investigate the relative importance of high temperatures, low dissolved oxygen, and incentives for more intensive fishing effort experienced in the Sound in 1999. The simulations show that low dissolved oxygen was the major factor underlying the die-off. Overfishing was a minor contributor, largely because fishing mortality in the Sound has been low relative to population size. These results indicate that stricter regulation of nutrient emissions may be the most effective way to protect fisheries like the Long Island Sound lobster fishery. They suggest in addition that global warming may exacerbate the problems experienced by coastal fisheries like this one, making the need for stricter regulation of nutrient emissions more acute.

Microeconomic influence of marine environment conditions on red seabream fishery of the strait of gibraltar

ID paper: 225

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This paper is aimed at determining the impact of the variability of marine environment conditions on the capture of a vessel that exploit the red seabream fishery of the Strait of Gibraltar. This paper estimates first and second order elasticities of a Translog approximation of a Stochastic Distance Functions of multiple outputs assuming time unvarying technical efficiency in order to get this aim. The evidences that sea surface temperatures have influence on growth and maturation and on the development of hermaphroditic gonads of different kinds of seabream support the consideration of sea surface temperatures as an approximation of the variability of marine environment conditions. Additionally, the growth pattern of red seabream provides meaningful information of this fish species that justifies looking in the relation between landings or red seabream abundance, and sea surface temperatures during spring with a lag of no less than two seasons. This paper concludes that technical efficiency of red seabream fleet is of 88% in period 2002-2004 and that an increase of 1% of mean sea surface spring temperature lagged 2 seasons results on a 27.50% decrease of captures. This paper also concludes that the relationships between the marine environment factors and the evolution of red seabream exploited fish stock take place a couple of year before the season and therefore the expected recruitment is known before it. This allows the policy-maker to design an adaptive management strategy accounting these relationships for a certain season once the historical evolution of the marine environment factors is known.

Fisheries management/FM05
Fisheries & environment

Optimizing dynamic catch quotas in stock fluctuating fisheries

ID paper: 363

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Historical long term changes in stock abundance have been related to climatic changes, and fish stocks seem to fluctuate over time in relation to warm and cold periods in ocean waters. Large fluctuations of fish stocks and long term changes in human harvest of marine resources are well known from long before modern exploitation started and harvesting technology became efficient enough to make significant stock reductions. This paper presents a simple approach for including periodic fluctuations in carrying capacity and recruitment long term patterns. This is done first by relaxing the assumption of constant carrying capacity of the Schaefer Gordon model and secondly, by making dynamic recruitment a function not only of spawning stock but also of critical environmental factors such as water temperature or nutrient availability, in an age structured bioeconomic model. Because there is no equilibrium biomass or sustainable yield in a fishery with fluctuating carrying capacity and/or recruitment, dynamic biomass and catch target and limit reference points (TRP and LRP, respectively) are calculated to aid fisheries management. In both approaches, a sine function is used to represent the long term fluctuating pattern in stock abundance. For specific cases appropriate periodic functions should be considered. Target biomass over time (TRPXt) is calculated proportional to the time varying carrying capacity. Fishing mortality is optimized (Fopt) to yield maximum net present values using alternative rates of discount, reflecting different prices of time. Fopt is then multiplied by time varying stock biomass to determine the corresponding optimum TAC over time. Keywords: stock fluctuating fishery, climate change, limit and target reference points, optimizing fishing mortality.

Welfare effects of random fishery closures

ID paper: 152

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This paper investigates the welfare effects of random closures in a fishery operating under open access. At each point in time, a fishery is facing the probability of an extreme event that impairs fishing activities but has no direct impact on the fish population. Examples include massive blooms of dinoflagellates that render fish or shellfish toxic to humans, massive algal blooms that foul motors and thus prevent fishing activity, and invasions of aquatic plants that spread rapidly in eutrophied waters and prevent fishing activity in the same way as algal blooms. We analyze long run equilibrium in such fisheries under the assumption that when such events occur fishing becomes infeasible for a period. We show that in the long run the fish population converges to a stable distribution. We show that random fishery closures of this kind can increase social welfare by allowing the fish population to recover from the overfishing due to open access and discuss conditions that render improvements in social welfare more likely. We examine those conditions empirically using an econometric model of population dynamics and fishing productivity in the Italian anchovy/sardine fishery in the northern Adriatic.

Fisheries management/FM06
Fisheries & environment

Quantifying the prestige oil spill over effect on the basque fishing industry

ID paper: 185

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The main objective of this paper is to analyze the economics effects that the Prestige oil spill over (2003) had on the Basque coastal fishing industry by means of a two-stage stochastic production frontier approach. The first stage is based on the econometric specification of a parametric production frontier based on pooled microeconomic data for vessels operating during the years 1999, 2003, 2004 and 2006. In the second a technical efficiency (TE) model is developed in order to explain the factors influencing on it, including the characteristics of fishing vessels and captains and fishing business itself. Finally, we are comparing the results obtained by the one-stage (Coelli, 1992) and the two-stage (Battese and Coelli, 1995) estimation methods. Our results indicate a substantial and statistically significant decrease on the incomes of artisan sub-fleet (around 30%) and a relatively moderated one (11%) on purse seines.

Global economic and environmental changes and fisheries viability: the case of the French Guyana shrimp fishery

ID paper: 282

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In the past two decades, the French Guyana shrimp fishery has known dramatic evolutions, largely driven by global changes. On the economic side, two major driving factors are the globalization of the shrimp market, with a decreasing trend in real prices, and the long-term increase in fuel prices worldwide. On the environmental side, recruitment of the two main species of shrimp targeted in the fishery seems to have decreased over the last decade, probably due to hydroclimatic modifications. It is important to assess the adaptive capacity of the fishery facing such changes, as well as the impact of past and future public policies on this capacity. A bio-economic model of the French Guyana shrimp fishery was developed in order to analyze the dynamics of the fishery. The aims of the modelling exercise were: 1) to account for the changes observed in the fishery over the past ten years and major drivers of those changes; 2) to simulate possible responses of the fishery to economic changes but also to environmental perturbations or regime shifts; and 3) to assess the consequences of past and possible future public policies on the bioeconomic viability of the fishery. The paper presents the key results derived from this modelling exercise, as regards assessment of the adaptive capacity of the fishery to global changes, and the role of public policies in this respect. This research was carried out as part of the Chaloupe program (http://www.projet-chaloupe.fr) funded by the French National Agency For Research (ANR).

Fisheries management/FM06
Fisheries & environment

Economic impacts of hypoxia on north carolina brown shrimp

ID paper: 265

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Although hypoxia threatens coastal ecosystems, policy makers have limited information about the economic impacts on fisheries. Studies using spatially and temporally aggregated data generally fail to detect statistically significant fishery impacts of hypoxia. Recent work uses disaggregated fishing data (microdata) and finds modest effects of hypoxia on recreational catches. Nevertheless, previous work ignores important features; the impacts of hypoxia on fish catches may not materialize instantaneously but instead may involve a lagged process with catches reflecting cumulative past exposure to environmental conditions. We develop a bioeconomic model to account for lagged effects using fishery-dependent data from North Carolina s brown shrimp fishery. We find that hypoxia is responsible for an 11% decrease in NC brown shrimp revenue from 1999-2005, assuming that vessels do not react to changes in abundance. We then explore the full economic consequences of hypoxia on the supply and demand for shrimp. Demand analysis reveals that the NC shrimp industry is too small to influence prices, which are driven entirely by imports and other domestic U.S. harvest. Thus, demand is flat and there are no measurable benefits to shrimp consumers from reduced hypoxia. On the supply side, we find that the shrimp fleet responds to variation in price, abundance, and weather. Hence, the supply curve has some elasticity. Producer benefits of reduced hypoxia are 5.6% of annual revenue (half of the computed gains from assuming no behavioral adjustment). Comparing to other ongoing research, our results suggest that the benefits from rationalization are likely to exceed the benefits from dramatic improvements in water quality.

A new arena of fisheries : An examination of sustainable fisheries development in war affected Northeastern Sri Lanka

ID paper: 108

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The fisheries sector plays a key role in Sri Lanka's economy, contributing about 2 percent to GDP. Out of three main subsectors, marine fisheries are of considerable social and economic importance around the entire 1 770 km of Sri Lanka's coastline. Now the sector is facing a vibrant change with the end of War which affected the whole country for last three decades. From a coastal development viewpoint, there is a significant scope for increasing the level of contribution from the sector through increased output, exploiting the potential for value addition while maintaining sustainable resource base. This research focuses on how we can harness these new found potentials of the marine fishery in a sustainable and integrated manner for the economic development of Sri Lanka. The paper identifies the significance of the fisheries sector of the coastal zone of Sri Lanka in general and eastern and northern coast in particular. Further it identifies the opportunities and constraints which can be aroused in harnessing the marine fisheries potentials in North-eastern coast. The research highlights the necessity of revising the marine fishery sector policies and strategies of integrated coastal zone management plan which are essential for sustainable development of the sector. Finally it focuses attention on the way forward in the light of lessons learnt in managing fisheries sector in a sustainable and integrated manner.

Fisheries management/FM07
Fisheries & CZM

The european fisheries fund and axis 4: a territorial approach to fisheries support in the eu

ID paper: 232

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The 4th Axis of the European Fisheries Funds presents a new approach in the way the European Union supports its fisheries sector. This Axis is devoted to the sustainable development of fisheries areas through a territorial approach. It dwells very much on the experience of the LEADER initiative which has successfully been used under the EARDF to support diversification of rural areas over the past 20 years. By shifting the focus of the support on the territory and the community away from the traditional sectoral approach, this method paves the way for the integration of the fisheries sector into the wider economic context and helps reducing the socio economic dependency of the area from a single activity. The specificity of the approach does not rely so much on the type of activities funded (even though they usually go beyond sectoral type of initiatives) but mostly by the way projects are developed. At the basis of the approach are local partnerships (Fisheries Local Action Groups or FLAGs) build by the communities themselves, which must be representative of the local social structure and that are in charge of developing a local development strategy. Call for tenders will then be opened by the local partnerships in order to select projects that fit within their strategy. Key to the success of this initiative is the bottom up approach where initiatives for the overall strategy and projects lie with the local actors. The first FLAGs have started their activities mid 2009 and due to the bottom up principle present a wide variety of organizational structures, strategies and projects. The first results of this initiative will be presented and the opportunities it represents in the context of the reform of the CFP will be discussed.

The fishery as an economic base industry after the newfoundland cod moratorium

ID paper: 251

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In a 2009 paper in Land Economics, Roy, Arnason and Schrank used a newly developed methodology based on cointegration analysis to establish and measure the role of the fishing industry as an economic base industry (and the only such base industry) for the Canadian province of Newfoundland over the period 1961-1994. Since that period, the groundfish harvesting sector has collapsed, although it has been replaced by a crustacean fishery that provides similar value added but is considerably less labor-intensive. At the same time, valuable petroleum deposits have been developed offshore which have resulted in considerable consequent economic activity, perhaps to the extent of establishing a new economic base industry. This study is based on the same methodology as in Roy, Arnason and Schrank, but will document the impact of both the major structural shifts within the fishing industry and the development of competing economic base sectors in petroleum extraction and its derivatives.

How do community partnerships create capital? Social capital, donor dependency and rehabilitation efforts of the tsunami affected fishing communities

ID paper: 296

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The paper empirically illustrates the social capital status of the tsunami re-settlements and its impact on donor dependency. After five years of Indian Ocean tsunami, study investigates the resettled fishing communities in eastern coast of Sri Lanka. Sample composed of 200 fishing families re-settled in new locations but not in their original places. Cluster sampling technique was adopted to select the fishing families and interviewer administered; pre-tested questionnaires and focus group discussions were implemented to collect the data. Results revealed that fishing communities are multi ethnic and multi religious in nature and Tamils and Muslims were the dominant groups. Tsunami as well as new re-settlement schemes in new locations were destroyed the generations old community bonds. Conflicts were the common feature among re-settlers and existing villagers in new locations and social workers and administrators have to work hard to create new ties among them. Fishers were categorized into 3 groups (high, medium and low) based on their level of social capital. Re-settlements having high level of social capital were less donor dependent compared to low levels of social capital. The main features of the high social capital re-settlements were family composition and occupation were similar to old establishment. Moreover, re-settlements with disturbed old village mechanism and fishers mixed with other occupancies showed low level of social capital and high donor dependency. Key words: social capital, donor dependency, re-settlements

Marine spatial planning and fisheries: the potential economic losses for fisheries in the context of competing interests in coastal zones

ID paper: 217

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There is an increasing demand for space from many different economic sectors in the German coastal and exclusive economic zone: sand and gravel removal, wind farms, fisheries, shipping or oil and gas exploration. Additionally, the Natura 2000 directive requires the declaration of areas for nature conservation. Opposite to other economic activities fishermen have no distinct rights on areas or on specific fishing grounds. First assessments show that fishermen may face heavy losses in case of the exclusive allocation of space to other activities. In the first part we depict the different economic activities in the German EEZ and the current process of spatial planning. Then we give an overview on the legal framework including the property rights system in the fishing sector. In the third part we calculate prospective losses in the scenario of the closure of huge areas for fishing. It will be shown that the approval process for wind farms underestimates the consequences for fisheries due to the lack of data. In many cases a reallocation of fishing effort will not be viable because of the dependency of certain species on specific habitats and their low abundance in surrounding areas. Especially small scale fishermen con only fish near the shore. Their individual quota can be interpreted as a strong property right. A closure of areas may have the same effect as a dispossession. In a fourth part we give an outlook on the possible process in marine spatial planning in the coming years.

Fisheries management/FM08
Fisheries & CZM

Measuring differential changes in commercial fishing ports: a shift-share analysis of north-central california

ID paper: 266

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This paper examines differences and changes in fishing activity among individual ports in a multi-species fishery using shift-share analysis. We describe overall trends in the fishing industry in north-central California and examine the extent to which different ports have fared differently. Trends in trips, boats, and revenue indicate that the level of fishing activity has declined dramatically in the region. We investigate whether all ports have been affected equally by this sector-wide decline; and if not, why not what factors make one port better able to support commercial fishing than another? We first identify and rank ports based on changes in fishing activity over time. We then explore some possible explanations for different levels of fishing activity, such as stock abundance conditions that vary over space, fishing regulations, supply chain issues (concentration of receivers or processors, idiosyncratic issues such as a sudden loss of a major receiver), and local policies including port infrastructure investments). We use a novel application of the shift-share method to perform the analysis. Shift-share, a non-parametric technique for visualizing trends, is a standard tool in regional science for describing changes in local communities, but it has not been applied to fisheries economics or fleet dynamics. Our results find evidence of fishing regulations as a strong driver of port-level fishing activity, and of both complementary and competitive relationships between nearby ports.

Moored fishing aggregating devices exploitation by small-scale fleets in the caribbean: review and outlook after 20 years

ID paper: 302

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Since the 1990s, moored Fishing Aggregating Devices (FADs) have had a sharp success in the Lesser Antilles and beyond, because they make it possible for small nondecked fishing units to reach, at low costs, offshore resources which they could do only seasonally or resources normally accessible by large scale vessels only. After 20 years of experience, the objective of the paper is to carry out an assessment of the impact of FADs on the basis of two case studies; the Guadeloupe and Martinique island fisheries in which two type of management approach have been implemented. Considering the primary objectives of FADs setting, the re-allocation of effort from overexploited coral reefs fisheries to offshore pelagic species and the reduction of seasonality in pelagic fishing yields, the paper analyses their achievement. A set of indicators were established to describe fleet structure, economic returns especially gross margin per metier and effort allocation all over the year. The difference in fishing patterns between the two case studies is tested to explain the gap in FADs density between the two islands. The consequences in terms of network FADs management (collective or private) including investment and maintenance cost around the islands are finally discussed by taking into account FADs interactions and interactions between vessels around FADs. Key words: Fish Aggregating Device, collective management, interactions, coral reefs fisheries, small-scale fisheries, indicators.

Fisheries management/FM08
Fisheries & CZM

WTP for artificial reefs in florida by residents, boat owners, and the for-hire sector

ID paper: 403

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Many of the coastal counties in Florida have active artificial reef deployment and monitoring programs. These reef systems have been shown to be an important destination for the marine recreational boating industry, as well as for the for-hire commercial sector (i.e., six-pack charter vessels, guide boats, party/head boats, and dive charters). These reefs are used for both fishing and diving. A series of surveys were sent to private boat owners (approx. 20,000), for-hire business owners (approx. 900), and for-hire patrons (approx. 6.8 million email invitations to an online survey) on their artificial reef use in Southwest Florida (i.e., Lee, Charlotte, Sarasota, Manatee, Hillsborough, and Pinellas Counties). Respondents were also asked a dichotomous choice willingness-to-pay (WTP) question that used a trust fund payment vehicle associated with their license renewal. Four fee levels were randomized across respondents. Yes responses were followed by asking how sure are you of this decision? with a closed-ended response format with four certainty levels. Those selecting very sure of their decision were also asked to provide the maximum they would be WTP. No responses were followed by asking them to provide a lower amount they would be WTP and, if not, why. Results will be used to explain to estimate WTP and explain WTP responses that program managers can use to justify continued investment in such programs.

Modelling economic effects of fishery regulations

ID paper: 417

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Due in part to limitations in data and models, fishery managers have been hindered in their efforts to simultaneously address economic and ecological effects of management measures. In the US, this promotes violation of National Standard 8 of the Magnuson Stevens Fishery Conservation and Management Act, which mandates that conservation and management measures minimize adverse economic impacts on [fishing] communities to the extent practicable. In some cases, fishermen's livelihoods have been sacrificed for sound ecological ends; in other cases neither economic nor ecological goals have been achieved. This paper describes a model that integrates social and environmental data to enhance managers' ability to evaluate outcomes of various policy options. While the implementation is local, the methods are applicable worldwide. Previous economic models have shown expected changes in fishery revenue due to management measures. This project further demonstrates changes in direct and indirect effects and displays those impacts geographically, providing a multifaceted picture of the consequences of a given management measure. This model incorporates government labor statistics, commercial fishery landings and industry survey data to depict a baseline economic status of the commercial fishing industry in Monterey County, California. An interface with an Ecosystem Based Management (EBM) model incorporates ecological data. The economic & EBM data are integrated to produce a thorough cost benefits analysis of various fishery management measures. The model further displays the results spatially. The final output, a map, explicitly demonstrates fishery regulation effects on the coastal communities of Monterey County, enabling managers to compare policy options.

Diversification of fisheries activities and construction of sustainability

ID paper: 243

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While French marine fisheries must cope with increasing difficulties, the concept of multifunctionality of fisheries is emerging through a diversification of their activities. Facing with new constraints (depleted resources, rising fuel prices, etc.), fishers develop alternatives to sustain their activity. They seek to find local solutions by introducing new kind of activities and innovations linked to their classic fisheries activities in order to confront with global changes (EU policies, globalized markets, climate change, etc.). These activities call for new ways of interacting with the environment questions, the role of institutional players, scientists, local stakeholders and customers together with their usual production activity. They develop alternatives based on the fishing boat activity by altering relations among fishers and the wider context in which they are embedded the coastal zone. When considered alone, each diversified activity seems to offer an individual solution of resistance. If considered all together, these solutions could become more relevant to support sustainable fisheries. Based on first results from two studies(1)led in France, in Brittany, and in the Channel (Interreg program), the aim of this research is to analyse how diversification of fisheries activities enhance sustainability and support integrated coastal zone management. By analysing activities of diversification in small-scale fisheries, we develop a classification of these heterogeneous activities. Then, we identify various strategies of diversification and their impact on the coastal zone. Finally, we analyse how diversification enhance resilience of small-scale fisheries, and how fishers become real actors with real links to other stakeholders, in order to built local policies in the coastal zone.

Risk and uncertainty in Yucatán (México) fisheries sector: gradual transition to the third economy through tourism development

ID paper: 416

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The history of commercial fishing activity in Yucatan coast has almost seventy years. In the late ten years, the fishing activity is in process of transit to another sector related to tourism (recreational) activity. At the same time the government promote other alternatives to fishing without take into account the sociodemographic consideration (migration labor force, ethnic group, religious status), economic drivers (urban and tourism development, economic mobility of labor force) and environmental problems (marine protected areas, environmental laws). Actually, in Yucatan coast there are 16, 000 fishers that combine three and seven comercial fisheries (octupus, lobster and groupers)to obtain livelihoods conditions. Seasonality in fishing and tourism is more and more the high condition to maritime households to survive. In this paper, I highlight these controversial issues with a anthropological perspective after two decades of research taking three fishing communities like cases studies from Yucatan coast. The causes and consequences of this gradual and rapid transition from fishing to tourism are closely related to globalization of economy and culture that marginalize the fishers more than others economic actors.

Econometric analysis of the factors contributing to the fish price increase in coastal TURFs in Japan: the case of the income pooling fishery for coastal shrimp Sakuraebi (Sergia lucens)

ID paper: 295

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While right-based managements have often been encouraged as effective management tools, few studies presented an empirical analysis on the effects of those systems. This paper focuses on a special form of Territorial Use Rights Fisheries called an income pooling system, and examines the effects of the system empirically. Income pooling system is a unique Japanese fishery management system where fishermen harvest fish cooperatively, and divide the total income based on a certain rule, in many cases equal distribution. The increase of fish price through control on landing amount and improvement of quality of fish is regarded as the main effect of the system in earlier studies, so we estimated the magnitude of the impact of two factors on the price of fish with econometric method. The results show that the two factors in fact have significant effects for the price changes. Also, the effect of the improvement of quality for the price is not negligible compared to that of control on landing amount. These results suggest that to improve the income of fishermen, the policy encouragingfishermen to improve the quality of fish is effective. This study can be regarded as one of the first attempts to use economic analysis to evaluate the economic performance of fishery management system.

Fisheries management/FM10
Fishing rights

The norwegian structural policy - maintaining productivity growth with a limited natural resource

ID paper: 332

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Overcapacity is probably the most fundamental challenge to fisheries management as it can lead to both overfishing and to low profitability. Most of the Norwegian fisheries have limited entry, through the use of annual permits (coastal fleet) and licences (ocean going fleet) in combination with individual vessel quotas (IVQ). Limited entry is necessary in order to secure a stable resource basis for the participants. This can also ensure profitability and future investments in the fishing fleet, without using fisheries subsidies. The shares of the overall Norwegian TAC is allocated to different vessel groups, and then distributed between the vessels within the different groups. This allows for several ways of reducing overcapacity, where marked based instruments have aimed at reducing the overall number of operating vessels, while simultaneously protecting the small-scale fleet, maintaining coastal settlements and encompassing regional considerations. The two primary structural instruments that have been employed are decommissioning and various systems for consolidating vessel quotas. In 2007 the current structural system was introduced in the White Paper Norwegian structural policy, which amongst other alterations put a time limitation on 20 to 25 years on the use of consolidated quotas, and the system was extended to include the vessel group between 11 and 15 meters. This extension was recently evaluated and examined in relation to other instruments used for this vessel group. This paper discusses the Norwegian experience of employing structural instruments within a limited entry scheme with individual vessel quotas.

Why aged fishers do not retire? Social welfare and overall profits to the industy

ID paper: 354

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Nearly 30% of fishers among 200 thousand fishers in Japan are over 65 years old in 2008. The Amount of fish landing is decreasing constantly and it is argued if aging fishers are the cause or the result of the industry decline. There are a number of merits to retain aged fishers in the community: livelihood fisheries provide them both extra income and pastime while supplying certain food for the society, or aged fishers put less pressure on marine resources by using simpler gears. On the other hand, the existence of the bulk of aged fishers curtails the incentive of the new entry, particularly of those young ones, that in turn slacken fishing sector. Similar to the workers of other industry sector, continuous pursuit of efficiency and cost reduction must be the agenda for vocational fishers but may not be for semi-retired aged fishers. One of the reasons for such fishers not to retire is because of the difficulty in transferring fishing rights that have been entitled to fishers after long years of engagement in the sector: carrier fishers own accumulated rights to fish but it cannot be transferred, in terms of leasing or selling, to the successor. In fact, there are examples of the trade of fishing rights in some European countries. In this paper, we examine if such right transfer arrangements with monetary transaction can increase both social welfare of fishers and overall profit to fishing industry.

Fisheries management/FM10
Fishing rights

Bargaining power in the market for input permits: the case of northeast us multispecies days-at-sea

ID paper: 365

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This research examines bargaining power in the market for Northeast Multispecies Days-at-Sea (DAS). In 2004, the DAS system was converted to a tradable input control system. Characteristics of the program include: 1) trading restrictions based on length and power to limit increases in output, 2) prohibitions that limit the ability of speculators or arbitrageurs to enter the market, and 3) no centralized marketplace for publicly posted prices. While economic theory maintains that value of excess supply should be equivalent to zero; this market appears to be characterized by large amounts of excess DAS, positive prices, and tremendous variation in price. The findings of this research suggest that this phenomenon may be explained by regulatory segmentation. That is, the trading restrictions based on length and power have resulted in many small markets for DAS, each with few participants. Some of these markets may clear at a positive price while others may fail to clear. Despite the shortcomings of this market, this research finds some evidence that markets performs reasonably well. The price of DAS is inversely related to the number of days remaining before the expiration date; a finding which is consistent with the decay of the time-value of financial options. In addition, prices are sensitive to aggregate supply and technological shocks; major policy changes that lowered the aggregate supply and productivity of DAS are found to have price effects that are consistent with economic theory.

The private fishery - and reality

ID paper: 293

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In discussing property rights, efficiency and fisheries management economic literature often refers to a hypothetical single owner, comparing it to fisheries with more fragmented ownership. Through a range of effort reductions, since the near collapse of the fishery in the early 1980s, the Exmouth Gulf Prawn fishery in Western Australia has emerged with a single owner. The fishery's economic, social and environmental performance was recently rated by a panel of experts at 9.8 out of 10. In the presentation the history and context in which a single operator emerged is outlined. Practical constraints and issues for a single owner are discussed in the context of the history of the fishery, corporate strategy, legislative restrictions and market structure. Comparison is also made with other prawn fisheries in Australia which have a more diverse ownership base.

Efficiency of individual transferable quotas (itqs) when fishers are able to choose vessel sizes: an experimental approach

ID paper: 61

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Individual Transferable Quotas (ITQs) systems are considered to achieve the efficiency of fisheries with the setting of Total Allowable Catch (TAC). Given the numbers of various sizes of vessels, we find that ITQs systems can achieve the efficiency if the quota market is perfectly competitive. On the other hand, in reality, fishers can choose both the vessel size and the amount of quotas. This implies that the numbers of vessels change after an ITQs system is introduced. We use an experimental approach to examine whether the efficiency of fishery can be achieved when fishers can choose the vessel size. In addition to the most common types of experiments for trading permits, we analyze that the subjects choose one from two types of vessels: a large-scale or a small-scale. The fixed cost for a large-scale is higher than that for a small-scale, whereas the variable cost for a large-scale is lower. We find that the number of small-scale vessels is greater than the case when the total cost of fishing is minimized, if (a) many are risk-averters, and/or (b) fishers expect that the price of quotas will be high. In the latter case, when the expected quota price is very high, fishers predict that the cost of fishing will also be high. Therefore, they lose incentives to choose large-scale vessels. Consequently, uncertainty on the fish price and high volatility of the quota price hinder an ITQs system from achieving the efficient structure of vessels in a fishery.

Profit sharing in renewable resource industries: implications and optimal management

ID paper: 128

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In renewable resource industries, labor is commonly paid with a share of the harvested resource rather than with a per unit-of-effort wage. Share cropping in agriculture is one well-known example and entitlement of the crew to a share of the revenue from the sale of the catch is almost universal among commercial fishing fleets. This paper shows that sharing arrangements have substantial implications for the industry's profits, optimal resource management, and the resource's ecological state. Effectively, sharing agreements can interact with fluctuations in natural capital to cause inefficient investment levels and skew industry rents toward labor. As a consequence, optimal regulatory policy for such industries must account for the implications of such sharing arrangements. The model demonstrates why management tools like individual transferable quotas in fisheries, have had unexpected ecological benefits in terms of increasing and stabilizing fishery stocks. Finally, the paper provides an illustrative example using the US Pacific albacore fishery.

ITQ markets in a fishery with crew shares

ID paper: 233

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The literature on ITQs as a fishery management tool predominantly assumes that all input prices are parametric. In many if not most fisheries, however, fishing crews are paid a share of the profits. The paper explores the efficiency of ITQ markets when crews are remunerated under a share system. Efficiency typically requires that crew bear equal shares of both non-labour variable costs and quota costs, although this is not strictly necessary in all cases. The implications of crew resistance to sharing in the cost of quota are considered, as are the effects of quota non-compliance under a share system.

Fisheries management/FM11
Fishing rights

Capital and labour interests under itq fisheries management : lessons for policy-makers

ID paper: 278

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The introduction of Individual Transferable Quota (ITQ) fisheries management is controversial as it typically results in fleet rationalization, fewer active vessels, and fewer vessel jobs. Moreover, under ITQ management the remaining vessel crew often earn a lower share of vessel revenues with capital interests, including the new interest "quota ownership", increasing their vessel revenue share. However,the move to ITQs can also increase the Total Allowable Catch (TAC), fish prices through quality improvements, and fleet revenues so that the actual compensation to the vessel crew can increase.There are other important, more subtle shifts in in the role and power of capital and labour under ITQs, including : 1) the uncoupling of capital and labour interests, especially in owner -operator fleets, 2) a weakening of the influence of broad - based fishing organizations such as unions, and 3) a deskilling and / or reskilling of the fishing workforce i.e. a different type of vessel crew is required. This paper draws on the experience of Pacific Canada fisheries in identifying several aspects of the shift in capital - labour balances under ITQ fisheries management. These "lessons learned" can help policy-makers navigate and interpret the labyrinth of rhetoric that often accompanies the discussion of ITQs.

Applying deemed value concepts to other cap-and-trade rights

ID paper: 298

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In the administration of its quota management system (QMS), New Zealand sets a deemed value fee that must be paid for any landings in excess of annual catch entitlements (ACE). The deemed value system is an example of hybrid emissions cap and tax system (Roberts and Spence 1976). This paper argues that there are two aspects of the deemed value system that could be applied to non-fisheries cap-and-trade programs. First, deemed values lower the transactions costs of conducting the market transactions to balance landings against ACE. Other cap-and-trade systems that potentially involve large numbers of small trades might benefit from using deemed values. Second, the New Zealand system also incorporates differential deemed values that escalate as the margin by which landings exceed ACE increases. These differential deemed values are an elaboration on the climate change idea of having a price cap on the traded rights. The differential deemed values are essentially options to acquire ACE at higher and higher prices. These options allow the implementation of not a single price cap in the traded rights, but rather several different price caps that depend upon the extent to which the quota is exceeded. The differential deemed values are implicitly a marginal cost of overfishing schedule established by the government. Other cap-and-trade programs could also use options to allow the government to supply additional emissions to the market along a pre-determined marginal cost schedule.

The effect of trade limitation in a fishery managed through individual transferable quotas

ID paper: 213

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Individual transferable quotas (ITQs) have been used in several countries worldwide as a fisheries management regulation system. Even though ITQs are assumed to facilitate the economic efficiency of fisheries, in practice they are not a panacea and distribution and equity issues have been raised in several cases. To overcome those issues, ITQ systems are designed with a set of parameters limiting the trade and capping ownership of quota units. The quota management system constrains catches to match individual's holding of quota. However, quota being transferable, fishers can decide to lease in or out quota units to equate their landings. In this study, we use an agent-based modelling approach to simulate the effects of introducing ITQs in the Tasmanian rock lobster fishery. Individual agent decisions regarding spatial and temporal fishing distribution are modelled at a monthly basis taking into consideration the profitability they derive from fishing rock lobster. A quota trading model is integrated into the fisher decision making process allowing fishers the choice of leasing quota units in or out depending on economic performance and their catch expectation. The model is then used to investigate the consequences of setting a limit on quota trading. The different harvesting pattern induced by a cap on trade and concentration of quota is expected to impact both the socio-economic performance of the fishery and the biological resource.

Rock lobster lease quota market: a network analysis

ID paper: 292

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ITQ introduction has had several effects on fisheries in terms of, for example, changes in the composition of the fishing fleet and fishing efficiency gains. After ITQ introduction in the Tasmanian rock lobster industry in 1998, an increasing number of fishers have become dependent on quota leasing to catch fish (Putten van and Gardner Accepted). At the same time quota owners who lease out their entire quota, increasingly characterises the fishery. The economic, social and cultural implications of structural changes observed in ITQ fisheries around the world (Eythórsson 2000) also apply in Tasmania, although the particulars of these developments vary. Changes in the Tasmanian industry are also observed in terms of the characteristics of the lease quota market and market participants. Brokers have an increasingly important role in trading lease quota thereby reducing the number of personal interactions. The role of processors in the lease quota market is also pertinent not only in terms of price developments but also in market interactions and dependencies. The change in market relationships and connections, in parallel with increasing dependence on lease quota by a large component of the industry, may be particularly relevant as strong social connections characterise this fishery. In this research, social networks in the quota lease market of the ITQ managed Tasmanian rock lobster fisheries are analysed. Changes in lease quota trade networks and network characteristics proceeding quota introduction in 1998 are analysed. The economic characteristics of different lease quota fisher types are also considered in this context. Network parameters indicate that the lease quota market can be represented by a scale-free network. Over time the market has become more strongly dependent on internal networks, in particular processors who take on the roles of pseudo brokers to ensure fisher loyalty. The change in network structure of the lease quota market indicates that a small number of quota owner investors and processor quota redistributors appear to be in an increasingly powerful position in this market. This development is surprising because disproportionate quota ownership by processor, as observed in many other ITQ managed fisheries, has been averted in Tasmania. Processor control in the lease market cannot be gained by purchasing quota due to a successful input control where quota ownership by one legal entity was capped. Because market control cannot be gained through investment in quota, it has been gained by virtue of redistributing lease quota.

A simple matter of herring fishery management

ID paper: 467

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In 1996, the US New England Fishery Management Council formed a technical team (PDT) to develop a new plan for Atlantic Herring (Clupea harengus harengus). The inshore stock was close to fully exploited while the offshore stock was underexploited. There were few full-time herring harvesters and very few processors. Fresh bait was in demand by the adjacent lobster industry. The industry had experienced a collapse in the late seventies and the original plan was withdrawn by the government in 1982. By 1992 conditions were ripe for rational federal management which would guide the redevelopment of the fishery while preventing over-harvest and the redevelopment of over-capacity. Despite the proposal of several ideas for permits (described) which would allow for what might now be described as a core fishery (Pontecorvo and Schrank, 2009), an open access regime was adopted in 2001. Several possible reasons for this are examined. Subsequently the PDT examined and proposed variations on what has come to be known as sectors in the Northeast (Kitts, this meeting). Their rejection in Amendment #1 (2006) is discussed. The explication of the sector notion in the amendment process helped spread the mis-labeled idea to other fisheries and other fishermen, however. Amendment #4 to the herring plan will revisit the sector options further. Other institutional complications to the application of secure privilege-based management in the US are discussed.

The inner workings of a market for transferable fishing rights in the florida spiny lobster fishery

ID paper: 344

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With a national policy on catch shares in progress in the United States and increasing use of transferable fishing rights in fisheries worldwide, it is important to understand how the markets created by these programs function in the real world. This paper presents information collected from interviews with Florida spiny lobster fishermen on how the market for trap certificates works, how they make decisions to buy and sell certificates, and their perceptions of the program. The interviews indicate that the fishermen participate in the market in ways we expect, but may be hindered by cultural and social differences that impede transfers; program provisions that affect decision-making in transfers; and the emergence of brokers in the market. The study also revealed how information about certificate prices and availability circulates within and between fishing communities, and how this affects the market and the outcomes of the program. When compared to results from previous analyses of transactions data, the interviews also provide information on validity of conclusions, and offers alternative explanations uncovered when the fishermen themselves explain the trap certificate market. The results of this paper suggest that management and regulating agencies should directly address these issues that could affect the market when developing and amending transferable fishing rights programs. Additionally, it exemplifies the importance of combining interviews with fishermen with economic analyses in monitoring and evaluation in order to gain a better understanding of how these programs work.

Dynamics of permit transfers in alaska salmon fisheries

ID paper: 430

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Fisheries management systems based on transferable permits or quotas have been adopted in numerous fisheries worldwide. Permit or quota transfers may result in changes over time in the distribution of where permit or quota holders live, which may in turn have important economic and social consequences for communities and regions. Where permit and quota holders live may affect where fish are landed and processed, where vessels are home-ported, where fishing income is spent, where fishing crew are hired, and the extent to which communities are (and perceive themselves as) fishing communities. There has been relatively little theoretical or empirical analysis of inter-regional transfers of fishing permits or quotas: why they occur and how they affect the regional distribution of permit and quota holders over time. This paper examines this topic for Alaska s limited entry salmon fisheries, for which more than three decades of data allow detailed analysis of permit transfers and the regional distribution of permit holders. Our analysis suggests that as fisheries become more profitable, the relative economic advantages of living close to the fisheries decline, increasing the share of non-local residents among buyers willing to pay the market price for permits, and reducing the long-run equilibrium share of permits held by local residents. This leads to a conflict between two important policy goals: increasing fishery profitability and maintaining local participation in fisheries particularly in rural regions where alternative economic opportunities are limited.

An economic analysis of structural changes in the Tasmanian rock lobster industry after ITQ introduction

ID paper: 102

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Concerns about declining stock and profitability in the Tasmanian rock lobster industry led to the introduction of individual transferable quota (ITQ) management in 1998. In this study, fisher groups were categorised by effort and quota ownership traits to examine response to revised management, and how profit drivers moderated this change. The number of investors who are not active fishers has steadily grown with a commensurate expansion of the lease quota market. The number of lease dependent fishers has remained steady through time while quota owner fishers have declined. In contrast to many other ITQ fisheries, the investor group has not consolidated into a small number of entities and there is little processor involvement. This was a result of fisheries rules explicitly designed to retain benefits of diverse ownership though a cap on the maximum allowed number of quota units per legal entity. Three categories of active fishers participate in the lease trade. Quota-transferring fishers lease quota both in and out, usually to secure access to quota at the start of the season with surplus quota being leased off later. Large-scale, lease quota dependent fishers have increased through time and are characterised by high fishing effort and high annual turnover but low profit per unit of fish. Small-scale lease quota dependent fishers utilise capital less fully and have less capacity to survive in the long run. These small scale lease fishers face barriers to entry into the large scale category through high upfront capital investment costs, which could hamper industry renewal. Potential issues for management that arise from lease-reliant fishers are (i) that their higher financial stress increases compliance risk and (ii) their lack of investment in quota assets reduces incentive for stewardship of the resource.

Production costs in developing fisheries under itqs: the new zealand king clam fishery

ID paper: 210

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Entrepreneurial New Zealand harvesters successfully created a viable diving fishery for King Clams, Panopea zelandica, in the 1970's contributing to the development of allocation rights to harvest. Once under the quota management system (QMS), however, allocations for allowable catch do not reflect the harvest potential for this fishery. Expectations for quota value and welfare are reduced by the fishery costs of production combined with the capital needed to develop the fishery. This paper identifies all costs of production in the development of this fishery combined with governance scenarios that address the multiple objectives of quota holders. Choosing the harvest approach to a developing fishery under a quota management scheme has flexibility but it is important to manage the shareholders interests while growing the fishery. The working model will specify the production and cost functions for a hypothetical quota owner/harvester under alternative governance scenarios that contribute to quota owner objectives. The model investigates scenarios to evaluate development approaches to improve quota holdings and promote the fishery over time.

The Northeast United States tilefish fishery: recent lessons from catch shares

ID paper: 424

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Amendment 1 to the Golden Tilefish Fishery Management Plan (FMP), which implemented the most recent catch share program in the Northeast United States, became effective on November 1, 2009. It replaced a program that allocated a fixed percentage of annual quota to three groups of vessel owners with a program of individual allocations. Reliable catch history information and recent experience with group allocations led to wide acceptance and therefore little disruption in administering the amendment. Catch share management has altered the infrastructure necessary for compliance monitoring, and data collection in fisheries. New data requirements provide for more transparent relationships between harvesters, dealers, and processors. The tilefish fishery provides the first opportunity to explore the benefits of this increased transparency. There was some initial consolidation within the fishery after implementation of the catch share program. Changes in responsibility are also noted due to the fish stock s allocation shifting from a group to individual level. These changes are examined together with other indicators of performance. An examination of the early consequences of the catch share system in this fishery provides useful insight on how similar programs might affect other fisheries.

Economic efficiency and sector allocations in the new england groundfish fishery: a comparison of sector and non-sector vessel performance

ID paper: 206

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The case for assigning private property rights in fisheries has been thoroughly studied but has lead to a new debate over whether rights should be allocated to groups or individuals. The New England groundfish fishery provides a rich context in which to study this question. Beginning in 2004, several dozen vessels (out of more than 1400 vessels with commercial groundfish permits) formed a cooperative, or sector , and were granted a group allocation of cod, one of the 15 managed groundfish species, to manage and exploit as a group. Most existing regulations and effort controls remained in place for the harvest of other species. The sector established a governing board and hired a manager who helps coordinate operations and enforces sector rules. This study uses detailed data from every trip taken by a vessel with a commercial groundfish permit for four years before and four years after sectors formed in order to compare performance of sector and non-sector vessels. A simple model of the property rights theory of the firm is used to predict the extent to which these sector vessels behave like a single firm, or independent firms competing internally. A stochastic frontier is estimated to test for changes in technical and allocative efficiency. Biannual data on innovation patterns is used to compare technology adoption patterns. I also examine whether and how sector vessels reallocated effort both within the groundfish fishery and in other fisheries in which these vessels held permits.

Fisheries management/FM15
Fishing rights

Operational excessive share protocols for catch share fmps under msra

ID paper: 290

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With the publication of the NOAA Draft Policy on Catch Shares, which encourages US Management Councils to adopt Catch Share Programs (yet another new name for LAPs, ITQs, or IFQs) there will likely be more deliberations on such programs. With changes mandated in the revised Magnuson-Stevens Act and the suggestions made in several Congressional studies, this will require a closer look at the required elements of operational protocols to address excessive shares in plan amendments which institute quota shares. The emphasis on the word operational is intentional. The purpose of this paper is to introduce some of the topics which will need to be addressed. An important issue will be the difference between, and the requirements to address, market power issues and what may be called management objective excessive shares. It will be necessary to define a conceptually clear process between the desired policy objectives and the requirement to define excessive shares in terms of a percentage of quota shares owned (or controlled) by a single entity. With respect to market power this should be related to standard Justice Department norms related to the ability to increase market price. Another important issue will be the need to define a point where there is an implicit or explicit hand off from the NMFS Regional Offices and the Justice Department when intervention is required on market power issues. Two of the criteria for determining this point will be the differences in their legal mandates and types of in-house expertise.

Modelling the collision of two different management regimes: when catch share system meets common pool fishery

ID paper: 350

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The New England Multispecies (groundfish) fishery is about to implement the catch share management system, where self-identified groups of harvesters called sectors receive quota allocations of total allowable catch (TAC) proportional to the harvest history of their members. Joining a sector is voluntary, thus there will be both sector members and non-sector members, which will remain in a common pool fishery, coexisting in this fishery. Basic game theory tells us that relative profitability between the sector and non-sector will dictate the flow of membership, while the profitability itself is a inversely related function of membership size. This raises an important question: will a success of a sector, measured by its increased profitability (rent), ultimately undermine the sustainability of that sector? What are the characteristics of an equilibrium, and how would that be affected by (a) the dynamics of biology (fish population) and economics (rent generation), and (b) the management scheme chosen by a sector? This paper develops a microeconomic model of fisher s behavior under sector allocation program based on the differential game theory, and solves for dynamic equilibrium in aim to answer these questions. The first model developed is where sector members with individual quota coexisting with non-sector members. Generally, sector members will wait until the non-sector members reach their collective quota, but an interesting result is that there will be some sector members who will opt to fish with the non-sector members. Revenue sharing in aim to foster collective effort coordination within a sector is also considered.

Fisheries management/FM15
Fishing rights

An experimental analysis of harvest timing in fisheries with sectors managed by different methods

ID paper: 358

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In many fisheries, harvesters of different scales, different gears, or on different sides of political boundaries crossed by a single stock are effectively managed separately. The New England Multispecies (groundfish) fishery is about to dramatically expand the number of management systems in place concurrently, by allocating portions of the total allowable catch (TAC) to self-identified groups of harvesters, to manage in any way they wish. Under this "catch share" system, groups (called "sectors") would receive quota allocations proportional to the harvest history of their members, and some groups' vessels may operate under individual quotas, while others may operate under daily trip limits, and yet other vessels will not associate with a group and remain in a common pool fishery. Understanding the economic consequences of this arrangement requires understanding how effort and harvesting patterns are affected when multiple management systems are applied concurrently to the same stock. We use human subject experiments to evaluate the interaction of groups of harvesters being managed by different systems, testing the predictions of control theoretic models. We focus on the interaction of a common pool derby fishery with an individual quota managed sector. Pilot data suggest that, in the presence of a harvest congestion externality, subjects in the common pool do race to fish, dissipating rents, and subjects managed by individual quotas wait for the common pool to exhaust its quota and be shut down, then apply a lower level of effort through the balance of the season to collect high rents.

Economic evaluation of a catch share program: evidence from rhode island fluke fishery sector pilot program

ID paper: 395

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A new type of fisheries management approach termed catch share is set to be implemented in the US Northeast groundfish fisheries in May 2010. This approach gives a group of harvesters, called a sector , a portion of the TAC to manage independently - a hybrid of co-management and individual quota. The potential for economic gain in the catch share program comes from avoiding the inefficiencies inherent in the current command and control style regulations. Two important questions arise when evaluating this new program: (a) will sector members be better off, and (b) will non-sector members be adversely affected? To answer these two questions this paper utilizes the Rhode Island fluke (summer flounder) fishery catch share pilot program and examines how harvesters' revenues were affected. To fully understand the economic impacts of the program four sets of predicted revenues are needed; sector and non-sector boat revenues with and without a sector. First we developed a 24 equation empirical model of inverse demand functions for key groundfish species and market categories targeted by sector boats using total Rhode Island landing data from 2005-2008. With-sector predicted revenues were calculated using this model and actual 2009 landings; the counterfactual without-sector revenues were obtained by first simulating sector boat landings using a multivariate matching technique and then running our model. Our preliminary results show increases in revenues from fluke and other targeted species for all sector boats. Furthermore, beneficial price effects extended to non-sector boats and they were not adversely affected by the catch share program.

Series of institutional and legal reforms in the fishery sector facing general governance crisis, a malagasy example

ID paper: 159

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Since the seventies, the Malagasy fishery sector management has been oriented by three paradigms: development, rationalization (looking for economic efficiency) and attempts of sustainable development (to reconcile economic, social and conservation goals). The institutional and legal frame of the marine sector has been characterized by many transformations linked to the political history (post colonial State, socialist period, economic liberalization...), the peculiar role of foreign assistance institutions and bilateral foreign relationships, the relations between State and private sector, the beginnings of a political decentralization process, the growing importance on conservation NGOs and a lasting general governance crisis&. The fishery sector, which has been for a long time presented as a dynamic one, mainly in terms of foreign currency earnings, is facing many challenges and difficulties since the middle of the nineties. This difficulties are linked to a complex set of factors : dependence from foreign markets, great poverty in the rural and traditional fishery sector, non competitive behavior of industrial sector. Such difficulties have lead the fishery sector to a very critical situation. The collapse of this system of management or of no management is possible. In this contribution, after a rapid description of the past dynamics of two representative components of the sector (the shrimp fishery and the traditional canoe fishery of the Toliara region), we shall discuss the evolution of the management system, with a particular emphasis on institutional transformation and legal frame reforms. The growing importance of the ecological conservation paradigm will be also examined from different angles. To which extend has it contributed to the new orientation of the fishery policy ? What are the apparent and real stake holders adherence to more conservative policy orientations?. We finally shall discuss the limits of fishery sector policy sector in a context of general governance crisis and lasting rural poverty for whom few and parsimonious solutions are envisaged.

Fisheries management/FM16
Fisheries Management plans

On the shared fisheries in south china sea and possible strategies for vietnam s fisheries

ID paper: 154

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The South China Sea (SCS) is a semi-enclosed sea and one of the most abundant commercial fishery areas in the world. Fisheries play an important role not only in the economy, but also in the food security of the countries in the SCS region. The SCS is also one of the world s most contentious areas in terms of both maritime boundary and territorial disputes. Territorial disputes are mainly in the Spratly Islands and the Paracel Islands, which are believed to include oil and gas deposits and are rich fishing grounds. There are six countries involved in these disputes, including Vietnam. Since the 1982 United Nations Convention on the Law of the Sea has called for cooperation to manage and conserve fishery resources in semi-closed seas, the SCS fishery cooperation may be a resolution of these disputes. Moreover, the fishery cooperation experience can spill over into other areas of cooperation in the SCS. Currently, the SCS fisheries are, however, still open-access. This study, therefore, provides an economic analysis of the potential for cooperation in the SCS shared fisheries. In addition, the reactive fishery strategies for Vietnam are proposed in two possible scenarios: (i) the continuation of the status quo and (ii) a move toward cooperation in the SCS fisheries with an example of the non-industrial fishery of yellow-fin and big-eye tuna in the disputed area.

The revised cod recovery plan: a change in the european fisheries paradigm?

ID paper: 314

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For the last 25 years, TAC have been the keystone of the European Common Fisheries Policy (CFP). Decided annually after a complex negotiation, these TAC are distributed among the European fishing nations according to complex historical rights: the relative stability, a fixed distribution matrix. This command and control system has survived the first revision (1992) and the first reform (2002) of the CFP and is at the centre of the debate for the next revision due in 2012. Introduced in 2005, the North Sea cod recovery plan has imposed, among other measures, a new limitation on fishermen: limited days at sea, modified in kW-days at sea in 2009. Many fishermen operating in and out of the North Sea claim that the recovery plan and the associated kW-days at sea limitations have deeply modified the management system applied to their fisheries, with numerous unintended consequences. This paper concentrates on the institutional aspects surrounding the implementation of the cod recovery plan and its extensions. It analyses the impacts of this recovery plan on the European management regime, focusing on governance, compliance and enforcement. Finally, the key question of paradigm shift is explored: is the North Sea still managed through a TAC/quotas system? and is this an insight of the future CFP?

Cluster industry, a procedure for fishery and aquaculture management in iran

ID paper: 121

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Management of fisheries is an issue that has received widespread attention in the literature. The particular concern is the relationship among fishermen, fish farmers, management institution and fish resources. This relationship is very important for sustainable development of sea resources in Iran. Overfishing, uncertainty in fish availability and changing Iranian government fisheries management are important challenges for fisheries and coastal management in the south of Iran. In addition, aquaculture in Iran is liked to the fish resources via spawner catch from the costal area. Iranian governmental fisheries management policy has changed during recent years. Government role in fisheries management changed from direct involvement to the monitoring and indirect management. In addition, there are some kinds of cooperative that available in the region. However, these cooperatives are not effectively involved in fisheries and aquaculture management. Cluster industry is a new approach that has been introduced recently and applied in some region (e.g. Port Lincoln Aquaculture Cluster in Australia). Industry clusters are groups of competing, collaborating and interdependent businesses working in a common industry and concentrated in a geographic region. This research examines a cluster establishment for Iranian fisheries and aquaculture in the south. The stratified random sampling and questionnaire was used for collecting data and shrimp framers, fishermen, governmental managers, and distributor's opinions. The result indicated that the cluster form of relationship among coexisting firms (fishermen, farmers and related industries) provides a source of sustainable management of aquaculture, fisheries resource and creates competitive advantage. Key words: Cluster industry, Aquaculture, Fishery management, Persian Gulf, Iran

Global assessment of the common fisheries policy through tac regulation

ID paper: 98

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With the objective to minimize the impact of fishing on marine ecosystems, in 2002 the reform of the Common Fisheries Policy (CFP) adopted long-term management of fishery resources taking a precautionary approach and multi-annual plans as key measures. Under such positive initiatives, the TAC (total allowable catches) regulation has continued to be set on an annual basis by limiting catch volumes for the main commercial species. In order to examine the success of the CFP in conserving the stocks, this paper constitutes the first comprehensive assessment by combining official data during 1986-2007 from (i) the recommended TACs by ICES scientific advice, the proposed and approved TACs, and (ii) biomass, recruitment, catches, fishing effort and catch per unit effort for all commercial fishery resources. The conclusions from the analysis suggest some positive improvements in the evolution in some stocks. However, the majority of them are still under strong fishing pressure, with biomass, catches and catches per unit effort declining through the CFP era. The results also indicate that the unsuccessful TAC system is a general phenomenon, even after the reform of the CFP.

The benefit of 20-20 hindsight; an evaluation of north sea herring management plans from 1995 to the present

ID paper: 341

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In 1995 North Sea herring was estimated to have declined from previous high of around 1.5 million to 400,000 tonnes, the point at which significant reduction in recruitment had previously been observed. The response to this was to cut the fishery by reducing the human consumption TAC by 50% and reduce the catches of juvenile herring for reduction even further. In addition the European Commission proposed a management plan to be followed. Since then this management plan has been revised twice. Elements of these plans have included 15% constraints on inter-annual change in TAC, nevertheless due to other clauses the management has resulted in an increase and a subsequent decrease of 50% in TAC during the last 15 years. We present an evaluation of the economic performance of the fleets operating under the plans over this period and discuss the lessons that can be learned for the design of management plans. The analysis includes the simulation of different strategies, including the impact of stock dynamics, and uncertainties in the estimation. In addition, the economic impact of the fluctuation in the TAC, in terms of earnings, profitability, return on investment, employment, crew wages and fleet structure will be assessed.

Fisheries management/FM17
Fisheries Management plans

Managing the transition to sustainable and responsible fisheries- an irish case study

ID paper: 466

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A Seafood Environmental Management Systems manual (SEMS) has been developed by Bord Iascaigh Mhara (The Irish Sea Fisheries Board) in conjunction with the Irish fishing industry to encourage fishermen to adopt an environmentally conscious, responsible and compliant approach to their business. The documented risk-based SEMS approach developed is essentially a bottom-up approach and enables fishermen to understand their operations and demonstrate they are responsible, while empowering the operator to communicate confidently and effectively. Experience has shown that this process has lead to fishermen realizing that by taking a responsible approach, they can positively influence the management process. This helps them to maintain access to the natural resource while also allowing them to engage in certification programmes that bring market rewards. This documented management system allows an operator undergo audit procedures in a constructive and easily achievable manner, such as MSC requirements within a fishery and also operator based, regional standards. The success and sense of personal achievement gained through third party validation of fishermen s efforts has resulted in a sustained and continuous growth on a journey that will ensure a long-term commitment by the catching sector to responsible practices. This paper highlights the approach to assist and empower the Irish catching sector embrace positive change, through adoption of an EMS approach which has proved to be an important tool for encouraging sustainable and responsible practices.

Reflecting on recommendations based purely on observations made while prawn trawling in the gulf of carpentaria, northern prawn fishery, australia: by-catch, quotas, fuel subsidies and other policy matters

ID paper: 287

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In the mid-90s the Commonwealth Scientific and Research Organisation (CSIRO) funded a social science (economics) research trip to the Gulf of Carpentaria. The objective of the trip was to observe and model commercial fishing patterns in the NPF, and develop an all encompassing model for describing fleet dynamics in the NPF. As an outcome from the trip a Markov fleet dynamics framework was developed (Ngwenya, 1997), and the empirical findings of the fleet dynamics model were reported in Ngwenya (2001). However, recommendations on by-catch, setting of a quota, pricing of prawns, vessel monitoring systems and the likely role of subsidies made on the basis of a qualitative analysis of fishing patterns in the NPF, were not published. In this paper, those recommendations that were based on qualitative analysis are reported. The recommendations are important in as far as they contribute to a historical account of fleet dynamics in the NPF, and also set the scene for developing long-term strategies for a sustainable fishery, using both qualitative and quantitative analyses. There are also fishery management lessons to be learnt from the observations made; in particular, the focus on a multi-disciplinary approach and mixed-methods research. The trip to the Gulf of Carpentaria was a real rare event in that it allowed a non-scientist and non-fisheries expert to observe commercial fishing practices in one of the Australian s best managed fisheries. The recommendations made are as significant and current as the Markov dynamics model developed from the trip.

Fisheries management/FM17
Fisheries Management plans

Advantages and issues in using a fishery management plan approach in developing countries: lessons from Mauritania and Senegal

ID paper: 421

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Worldwide, the scientific community and international organisations have gradually agreed on the need for an ecosystem-based approach to fishery management. However, the practical implementation of such an approach faces huge problems, especially in developing countries where current fishery management systems are generally weak. One way to improve a fishery management system is to define a set of clearly-defined fishery management units with fishery management plans developed for each unit. The absence of such units leaves fishers free to roam from stock to stock and reduces fisheries management to an ultimately fruitless exercise to reduce fishing effort (which in fact generally means fishing mortality derived from general production models). In western Africa, Mauritania and Senegal are engaged in the process of moving towards an FMP approach, and this paper attempts to use their experience to draw lessons for other developing countries. The use of an FMP does not ipso facto ensure success; its precise components will, of course, be critical. Nonetheless the mere adoption of the approach has the advantages that it forces stakeholders to define the nature of the problem to be resolved (in defining the units) and it clarifies the roles of different institutions within the overall management system. A key issue is that the FMP approach highlights the need for change in areas such as the institutional framework (including the organisation of the line Ministry), the exploitation system, the research support system, and the monitoring (including statistics), control and surveillance systems. As always, such large change will face vested interest. In many developing countries, it will also require the support of development funds.

Optimal dynamic enforcement of a fishery

ID paper: 167

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It has been established that the path of a fishery over time, i.e. stocks, fleets, effort and profits, depends inter alia on the enforcement of the fisheries management rules in place. It has further been established that optimal enforcement of fisheries management rules depends inter alia on the shadow value of biomass at each point of time. This raises the question of the optimal path of fisheries enforcement over time. Given a certain state of the fishery, a fisheries management system, enforcement tools and a penalty structure, what would be the optimal enforcement effort over time? This paper deals with this issue. Given the above constraints, it attempts to solve the dynamic problem of optimal enforcement of the fisheries rules over time. Not surprisingly, it turns out that the optimal enforcement effort should definitely not be constant. On the contrary, given the other parameters of the problem, optimal enforcement is generally a function of the state of the fish stocks at each point of time. In fact, it appears that the optimal enforcement effort should be a monotonically declining function of the fish stocks (provided a sustainable fishery is optimal). A related issue is the target harvest that may be set under the fisheries management system. The optimal path of this over time and its interaction with optimal enforcement is also explored.

Fisheries management/FM18
Enforcement of fisheries management rules

Capacity and non-compliance in a quota regulated fishery

ID paper: 427

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Two of the main problems in fisheries management are over-fishing and over-capacity driven by the production externality inherent in common property resource use. Quotas have been introduced to cap total catches, and regulations such as input restrictions and limited entry have been used to reduce the capacity problem. Economists generally agree that to ensure efficiency, quotas should be individual and transferable. Individual quotas remove the incentive to race to fish and thereby the incentive to build up or maintain excess capacity, while transferability ensures efficiency since the more efficient agents in the industry can buy quotas from less efficient agents. However, when firms have the opportunity to exceed their quotas (at the risk of being detected and punished) and enforcement is imperfect, it is not necessarily the case that efficiency can be achieved by use of individual transferable quotas. The production externality is only dealt with imperfectly. With imperfect enforcement of quotas, firms may have incentives to build up excess capacity relative to what is needed to produce the quantities specified by their quotas. Furthermore, firms with more excess capacity may have stronger incentives to violate quotas. In this paper, we investigate these links between production capacity, quotas and illegal fishing. We start out by theoretically analyzing the relationship between production capacity and illegal fishing. We show that excess capacity leads to increased illegal fishing, and that the possibility to exceed quotas (imperfect enforcement) gives firms incentives to build up excess capacity relative to what is needed to produce the quantity specified by their quotas. We then provide an empirical analysis of the relationship between illegal fishing and fishing capacity using data on the Norwegian cod fishery. The implications are that unless quotas can be enforced perfectly, additional management instruments are required to deal with the incentives to build excess capacity, which in turn exacerbates the problem of illegal fishing.

Fisheries enforcement when avoidance is possible

ID paper: 168

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When fishers can avoid detection and/or sanctions for violating fisheries management rules, the fisheries enforcement problem becomes substantially more complicated. A number of issues immediately pop up. First, the effectiveness of enforcement effort is reduced. This, ceteris paribus, reduces the optimal enforcement effort. Second, the impact on the fishery of increasing enforcement effort or penalties for violations is no longer clear cut. When fishers can take steps to avoid detection or sanctions, it is possible that the relationship between the level of violations and the level of penalties or enforcement effort is reversed; i.e. higher penalties lead to more violations and vice versa. The third issue relates to the net social benefits obtainable from a fishery under these circumstances. Is it possible that most or all of the potential fisheries rents may be dissipated by the cost of increased avoidance activity? This paper deals with these issues. It constructs a simple model of the enforcement problem under avoidance and attempts, on that basis, to provide partial answers to the questions raised above.

An economic approach to optimizing the level of observer coverage

ID paper: 73

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The US Magnuson-Stevens Act authorizes the use of onboard observers to monitor commercial fisheries catch and bycatch (PFMC 2003). A question of concern in implementing an observer program is that of the appropriate level of observer coverage. Current practice varies by fishery; for example, the California-Oregon drift gillnet fishery for swordfish and thresher shark has employed an observer coverage level near 20 percent of effort since the program s inception in 1990, while the Hawaii shallow-set longline fishery currently requires a 100 percent coverage level to implement a sea turtle quota with shut-down provision which requires in-season fishing effort to end once either sixteen leatherback turtle or seventeen loggerhead turtle gear interactions have been observed. We propose an economic approach to examining the question of what percent observer coverage level is optimal. Following Segerson (2007), we assume that bycatch occurs as a stochastic process whose mean level is conditionally dependent on the nominal level of fishing effort. We further assume a regulatory constraint to limit protected species bycatch through a quota with a stochastic shut-down provision which ends in-season fishing effort once the quota is reached with a specified predictive probability. Assuming a fixed cost per observed set of fishing effort, we develop and illustrate an efficiency criterion for determining the best level of observer coverage to balance the costs of a higher coverage level against the benefit of increased certainty that a protected species interaction quota has not been exceeded. References: PFMC, 2003, Fishery management plan and environmental impact statement for U.S. West Coast fisheries for highly migratory species. Pacific Fishery Management Council, Portland, OR, August 2003. Segerson, Kathleen, 2007, Reducing Stochastic Sea Turtle Bycatch: An Efficiency Analysis of Alternative Policies, Department of Economics Working Papers (University of Connecticut).

Resource assessment surveys as the basis for effective fisheries management

ID paper: 254

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This paper discusses the use of resource assessment surveys as the basis for effective fisheries management drawing on the resource assessment survey of the Arabian Sea coast of Oman. This survey, completed in 2009, has been undertaken in the context of the primary aim of the Oman Ministry of Fisheries Wealth (MFW) being to ensure that fisheries are developed and managed for the advantage of the people of Oman in a manner that is sustainable, maintains biodiversity and is consistent with the Code of Conduct for Responsible Fisheries. The goal of the survey was to provide estimates of the fishable biomass of principal demersal, small pelagic and mesopelagic fish species off the Arabian Sea coast of Oman for ongoing stock assessment of Omani fisheries, to guide development and investment decisions. The MFW is now engaging in development of a coastal fishing fleet and assessing the most appropriate management approach for this fishery. The MFW view is that the resource potential within the country s territorial waters (as indicated by the recent fisheries resource assessment survey), limited harvesting capacity, extent of technological advancement and economic performance of the current traditional fleet, indicates that the current level of exploitation of fish resources is not optimal. Management proposals must be developed in the context of the survey findings. Comparison will also be made with the resource assessment survey completed for the waters of the United Arab Emirates and the subsequent management initiatives developed in Abu Dhabi based on the results of the resource survey.

Can simpler assessment techniques save fish, time, and money?

ID paper: 377

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In fisheries around the world there is a widening gap between the number of stocks that require assessments and the number of completed assessments. This may be a result of stock assessment techniques which are inaccessible to all but a few scientists, that require significant data, or are costly to implement. This situation has serious management implications for fisheries which are characterized by limited data, resources, and scientific skills. Recently, several alternative stock assessment techniques have been developed which may be more accessible to fishery managers around the world and less costly to employ. To evaluate the potential benefits of these approaches we use a bioeconomic model of the U.S. west coast groundfish fishery and trawl fleet to illustrate how the coast-wide stock of canary rockfish, (Sebastes pinninger), could have fared if a simple method for assessing fishery health, using indicators based on the age-structure of the catch, were implemented during a period of rapid expansion in the fishery. A discrete-choice model of fleet behavior incorporating historically-based parameters is used. The technique is evaluated with respect to: 1) its effectiveness in accurately representing the status of the stock, 2) the potential economic consequences of implementing this technique, and 3) possible implications for the reduction of uncertainty bounds surrounding existing estimates of stock status.

The evolution of fish biodiversity: a time series approach

ID paper: 367

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In other to implement the ecosystems approach to take care of fisheries and their surrounding environment, multidisciplinary indicators are need. One of these indicators, which may be useful to measure the health of an ecosystem, is biodiversity. Thus, firstly this paper deals with defining, measuring and comparing alternative biodiversity index based on data from landings of the Basque artisanal and trawling fleets taking place during the period 1980-2007. Secondly, a time series analysis is undertaken in order to identify the variables, events and/or policies that may have influenced on the evolution of the biodiversity index proposed in the paper. Special attention will be plaid to test short-term effects on biodiversity as a result of the Prestige oil spill over.

Economic data collection in the fisheries sector from 2001 to 2009 in France: a support for scientific advice regarding the common fisheries policy

ID paper: 230

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In 1995, the Code of Conduct for Responsible Fisheries was adopted by the Food and Agriculture Organization. The Code emphasized that the development of fisheries management plans required appropriate reliable data on all aspects of a fishery. In particular, the Code stressed that in order to insure the sustainable management of fisheries and to enable social and economic objectives to be achieved, sufficient knowledge of social, economic and institutional factors should be developed through data gathering, analysis and research (article 7.4.5). Based on these considerations and in order to provide the scientific basis for the implementation of the Common Fisheries Policy, the Fisheries Council of the European Union decided in 2000 to establish a Community program for the collection of data needed to evaluate the situation of the fishing sector. The aim of the article is to describe the methodology applied by Ifremer in France since 2001 in order to satisfy the EU requirements in terms of economic indicators, precision and quality of information. Yearly, an optimized sample of about 15% of the total French fleet is defined and economic and social data are collected from direct surveys of fishermen. The data collected are gathered into the economic database of the Ifremer Fisheries Information System and processed in order to characterize the economic status of all the French fleets including coastal fleets. One major result is the re-evaluation of the role of small scale fisheries in the French professional fishing sector. This data base is a support for scientific advice regarding the common fisheries policy. Keywords: data collection, economic indicators, sampling plan optimisation, precision levels, coastal fisheries

Fisheries management/FM20
Fisheries indicators

Socioeconomic data for fisheries off alaska: current status and needs

ID paper: 275

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Management actions considered by regional fishery management councils can generate significant impacts on the magnitude and distribution of the economic and sociocultural well-being of stakeholders. It is therefore important that policy analysts be able to account for the relevant parties whose economic well-being is affected by fisheries and derive estimates of the elements that comprise each party s net economic benefits derived from utilization of resources. We survey the primary state and federal socioeconomic data that are systematically collected for analyzing fishery management actions in and off Alaska and note the critical areas in which data collection should be enhanced to improve socioeconomic analyses. By designing data collections to better encompass the appropriate group of stakeholders for whom impacts should be considered and to capture the relevant costs and revenues in fisheries, analysts can provide fishery managers with a significantly heightened ability to evaluate the trade-offs associated with different policies and management actions. Many of the lessons learned in analyzing data capabilities and needs in this region can be of use to analysts elsewhere, whether they are trying to best utilize existing data or implement new data collection programs.

Jobs and income indicators of canada's fishing industry

ID paper: 483

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The Jobs and Income Indicators (JII) Project is the culmination of a two-year data analysis project between Fisheries and Oceans Canada (DFO) and the Canada Revenue Agency (CRA). Based on tax-filer data from CRA databases, the JII Project aims to create an up-to-date picture of the socio-economic trends affecting those who make a living in Canada s fishing industry. In addition, the income and employment indicators gathered in this project at both the provincial level and the community level will help DFO to evaluate the socio-economic implications and distributional impacts of Departmental policies and programs. The results are based on tax-filer data for the period of 1994-2006, which will provide historical trends of how the Canadian fishing industry has evolved over time. The study covers a range of topics, such as employment, gender, age, employment distribution, composition and variability, and attachment to the industry. Four fisheries related employment categories are reported: self employed fish harvesters, wage-earning fish harvesters, processing employees, and aquaculture employees. Finally, the report looks at possible alternative employment options as a way of measuring the degree of fishery-reliance of provinces and communities, as well as of understanding how fishing related incomes compare with earnings from other sectors. This project is expected to shed light on some of the peculiarities of this rather unique industry that has a high degree of uncertainty and external forces that often play an outsized role in its success or lack thereof.

Sustainable development assessment and the management of heterogeneous fisheries activities: the case of European Union participation in Senegal s marine fishery

ID paper: 130

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The article introduces a methodology for evaluating the sustainable development consequences of the activities of heterogeneous fishing groups frequenting Senegal s marine fishery. A discussion of the conditions for sustainable development suggests that the sustainable development of fisheries is dependent upon complex interdependencies between heterogeneous factors. The complex interdependencies between these factors leads to the assumption that assessing the sustainable development status of fishery systems should rely upon descriptive multi-criterion assessments rather than the use of composite sustainability indices. A descriptive multi criterion assessment method is developed and proposed as a means to evaluating the sustainable development consequences related to the activities of three user groups frequenting Senegal s marine fishery. These groups are the local artisanal group, the local industrial group and the European Union distant water fleets which were present in Senegalese waters until June 2006. The assessment method is applied in an empirical analysis of the sustainable development impacts of the activities of each of these groups. The results of this evaluation show that the heterogeneity of the user groups frequenting Senegal s marine fishery can be capitalised upon through allocating fishery access in accord with each group s ability to generate sustainable development benefits, while taking policy action to mitigate against their negative impacts. On the basis of these findings the article suggests that the presence of an EU fleet in Senegalese waters could play a meaningful role in ensuring the sustainable development of Senegal s marine fishery.

Simulation model evaluation of some fisheries balance indicators

ID paper: 310

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Chronic overcapacity has been identified as a major cause of the overfishing of Europe s fish stocks and the poor economic performance of the European fishing fleets. Mechanisms are needed to ensure that the capacity of European fishing fleets remain proportionate to available fish stocks. To that end, the European Commission developed Guidelines for an improved analysis of the balance between fishing capacity and fishing opportunities , which specify a minimum set of fleet-based technical, biological, economic, and social indicators that purportedly measure the balance between fishing fleets and fish resources. A bioeconomic simulation model was developed to assist in the evaluation of some of these balance indicators. The model is age-structured, like standard single-species stock assessment models, but accommodates multiple independent fish stocks that are harvested by multiple independent fishing fleets. The fish stocks occupy multiple areas with diffusion of fish between areas. The fishing fleets choose where and how to fish based on anticipated profits. Randomness in the system includes variation in fish recruitment and in the relationship between fishing hours and fishing mortality, and variability in the prices for fish, fuel, labor and equipment. The model was used to generate data series of balance indicators that were then compared against the true conditions in the simulated fisheries to evaluate whether the indicators provide accurate signals of system status.

Fishery-based indicators of management impact : assessing relevance and robustness using a bio-economic simulation model

ID paper: 323

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Indicators are widely used in fisheries management decision process as measures for monitoring ecosystem status or management performance. In the current context, the shift to an ecosystem-based approach to fisheries management requires to complete usual population or community indicators with indicators reflecting state and dynamics of fishing activity as well as economic viability. However, it is difficult for decision makers to select relevant indicators among the numerous existing ones. In addition, the complexity of the mechanisms involved makes the unequivocal interpretation of indicator variations seldom possible using only statistical models. We propose to resort to the ISIS-Fish fishery dynamics model to select robust and relevant fishery indicators. ISIS-Fish population sub-model was set up to reproduce major processes of anchovy population dynamics in space and time and surplus production models were used for the other target species of the fishery. To take fishermen behavior into account while modelling fleet dynamics, we considered a discrete choice model using economical interest in the different possible métiers, fishers habits and management constraints within a random utility modelling framework. Applying sensitivity analysis methods, simulation designs were built crossing a variety of management scenarios and uncertainty hypotheses. Consequently, a list of resulting candidate metrics referring both to population and fishing activities were computed and statistically analyzed. Metrics that were the most sensitive to management and the most robust to uncertainties were considered to be relevant and selected for assessing management impact on the fishery.

Defining social & economic performance measures for catch share systems

ID paper: 338

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Catch share systems are being encouraged and considered in a variety of United States fisheries. Scientists, policy makers, and stakeholders have different views about the potential social and economic impacts of these output oriented systems. Nonetheless, identifying and evaluating impacts overtime are essential to assess and improve such systems. Over the past 12 months, staff in the Social Science Branch at the NOAA Fisheries Northeast Fisheries Science Center have defined key measures of social and economic performance of catch share systems, and identified indicators and informational sources to guide the evaluation of these programs in the future. The principal performance measures are financial viability, distributional outcomes, stewardship, governance, and well-being. We review the current state of catch shares in the Northeast United States, provide the methodology used in identifying performance measures and associated indicators, and present the social and economic performance measure monitoring plan that will guide future investment in social science research at the Northeast Fisheries Science Center.

Fisheries management/FM21
Fisheries indicators

Wealth-based fishery performance indicators (fpi) for the evaluation and cross-country comparison of management systems

ID paper: 476

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The paper will report on the development of a new set of wealth-based Fishery Performance Indicators (FPI) for evaluating and comparing the world s fisheries management systems. A wealth-based fishery management system is one that is ecologically sustainable, socially acceptable, and generates sustainable resource rents or profits. The Fishery Performance Indicators identify and measure key factors that are indicators of success or failure in the creation of wealth (outputs) from fisheries. Furthermore, we will identify key factors that are inputs enabling the conditions and contributing to the process of developing wealth-creating fisheries. We have designed the FPIs so that we can assess the level of wealth that is being generated and establish its connection with the individual input factors that may or may not be determinants of performance. This will give stakeholders who are reliant on fisheries for their livelihood critical information to make a case for better fisheries management based on a broader set of criteria incorporating governance and economic factors, many of which are currently being ignored.

An Assessment of two approaches for measuring commercial fishery dependency

ID paper: 161

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Two economic base analysis techniques that identify and measure commercial fishery dependency at the local level are compared. The most common method, the location quotient technique, uses direct metrics of economic activity (sales, employment, wages, or value-added) to compare a local economy with a reference economy. We compared this technique with the total contribution technique a more complex and data intensive approach, which in addition to direct metrics, incorporates indirect and induced activity attributed to local support industries. This is constructed from Social Accounting Matrices contained in a commercially available regional input-output package called IMPLAN Pro. Dependency indices, which show the percentage of employment and gross regional product accounted for by the export base sales of harvesters and processors, are the basis for our comparison. The results indicate the importance of identifying and including the economic effects of supporting industries when measuring and tracking temporal changes in commercial fishery dependence. The two techniques are applied to county level data to evaluate if the rank order of the index value among coastal counties is affected by the dependence measure. This test is important because county level data available through secondary or commercial sources are not usually available at the fishing port or community level. Thus, applying economic base measures of dependence at the community level may require a consideration of tradeoffs between more precise measures of dependence and data collection costs.

Fisheries management/FM22
Fisheries indicators

Economic analysis of fishery in the northern persian gulf

ID paper: 122

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There are many fishing landing areas in southern Iran, distributed all along the northern Persian Gulf. Despite increasing effort, the total catch has fluctuated in recent years. Iran is facing with over capacity of vessels and too many fishers, yet simultaneously political, social and economical pressures exist for expansion of fishing effort. It is extremely difficult to make management and resource allocation among competing user groups. This study examines the technical efficiency and profitability of the fishing industry in order to select the best fishing vessels group. The results indicate that wooden vessels of medium size are more efficient than small fiberglass vessels. The result of profitability analysis using internal rate of return, and benefit cost ratio indicate that big vessels are in critical stage. Although small and medium vessels are profitable, but medium vessels are more economically efficient than others. Key words: Persian Gulf, Profitability, Efficiency, Fishery Management

Economic performance of open-access offshore fisheries: the case of gillnet vessels in khanh hoa, vietnam

ID paper: 250

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Vietnam s policy was to shift the fishing pressure from onshore to offshore water since the coastal resource has been overexploited, and a program of investing offshore vessels has thus implemented since 1997. A question may be arisen if this program has been efficient and whether the offshore fleet is profitable or not? This study evaluated the economic performance of the offshore fishing fleet in Vietnam the case of gillnetting fishery in Khanh Hoa province. The main economic indicators are estimated, such as gross cash flow, net profit, profit margin and return on investment. The economic performance of the gillnetters with and without the subsidies for fuel is also compared. The result of the study also shows which group of the vessels gets intra-marginal rent. This paper then presents the implications of policy for the offshore fishing fleet in Vietnam.

Fisheries management/FM22
Fisheries indicators

Deep sea fishing in Sri Lanka

ID paper: 313

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The deep sea fisheries in Sri Lanka have been in existence since the late 1980 s. After 2000 a significant growth has been experienced in the industry. This has mostly been due to the rapid increase of new vessels with modern technology and the development of export market opportunities. The Sri Lankan deep sea fishing totalled 102 kMT in 2008 or around 41% of the country s marine fisheries catch that year. The authors research aimed at both determining the economic efficiency and estimating critical operational factors for different length groups of the deep sea fisheries vessels operating in Sri Lanka. Building on studies from Merrilene Peramune in 2005 and Gunnar Thordarson in 2008 a new interview survey was conducted. A cross sectional questionnaire survey interview data, taken during January through August of 2009,on operating costs, income and trip length of deep sea vessels was undertaken in order to collect data from a convenience sample. The sample consisted of 100 captains operating on multy-day boats out of the 3,318 deep sea vessels operating in 2008. The findings suggest a strong link between size and revenue supporting earlier conclusions that most of the multy-day boats (smaller than 40 feet) are unsuitable for providing fish quality fulfilling export standards. This is mostly due to the poor fish preservation systems of the smaller deep sea vessels and the lack of coordinated fishing and marketing. It is suggested that in order to improve the quality of the catch collective fishing and information sharing should be implemented.

The survival of cultures: preemptive compensation, natural resources and poverty

ID paper: 45

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In developed and some less-developed societies, managing an open access, renewable natural resource sector generally involves taxes, quotas, or other government or community restrictions. But some cultures, especially in their early years, have taken a different approach, one that involves transfer of part of the output of the resource sector to other community members. This reduces the latter s need to compete for access to that sector and, instead, induces them to apply their labor to production elsewhere in the community. This preemptive compensation policy may lead to resource conservation, participation in international trade and higher living standards for the entire community. This seems to be especially relevant where the natural resource sector is the primary source of food (e.g., a fishery) and where persons outside of the sector, but within the community, face extreme hunger. We develop a model that examines the phenomenon and we suggest conditions under which the sharing approach may eliminate hunger and lead to sustainable growth. The paper, then, reviews a strategy for renewable resource management that differs from most current approaches and, yet, can be traced to prehistoric times. We demonstrate one way that the renewable resource could be efficiently utilized without government restrictions, even under open access conditions. This can lead to a reduction in poverty and can replace economic isolation with participation in the global economy. It also offers an hypothesis for why some traditional societies have been able to support large populations over time, while avoiding resource devastation.

Fisheries management/FM23
Taxation of the fishing industry

On the economic distortion of pure resource rent taxation

ID paper: 166

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It is often taken for granted that taxing resource rents in a fishery or another natural resource-based industry does not affect the behaviour of those taxed. If this were true, resource rent taxation would be economically non-distortive, i.e. could be imposed without economic costs (apart from administrative costs of course), and would constitute an ideal tax base. In this paper, the veracity of the contention that resource rent taxation is non-distortive is examined. It is shown that the proposition is not true in general. Several sources of economic distortion stemming from resource rent taxation are identified and the process of distortion described. Finally specific cases where economic distortion may not occur are examined leading to a statement of a non-distortionary theorem which specifies conditions under which resource rent taxation will not be economically distortionary.

Combining property rights and landings taxes to mitigate the ecological impacts of fishing

ID paper: 267

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Economists have long extolled the virtues of fishery rationalization programs, but an obstacle to widespread adoption of property rights-based fishery management is a lingering concern that ITQs fail to address the ecological consequences of fishing. Of particular concern is that economic incentives to harvest larger fish (due to size-dependent pricing or quota-induced discarding) can destabilize fish populations or lead to evolutionary changes. A substantial theoretical literature in economics has explored incentive problems in ITQ fisheries but has treated highgrading as part of the stock externality. We provide an alternative viewpoint in that the stock externality and the size-based incentives are two distinct externalities and thus require two distinct policy instruments. In this paper, we show that if managers know the price-by-size distribution and the size distribution of the population, total revenues and total catch (in weight) by vessel are sufficient statistics to design a schedule of revenue-neutral individualized landings taxes that eliminate the incentive to highgrade in an ITQ fishery. That is, landings taxes can be used to address the ecological consequences of fishing while using ITQs to address the open access stock externality. To explore the empirical relevance of this finding, we examine the U.S. west coast sablefish with a life history simulation model. We find that in the absence of a size limit, the mixed instrument (ITQ combined with a landings tax) would actually harm the sablefish population, but the mixed instrument would help a hypothetical slow-growing fish that is otherwise biologically similar.

Fisheries management/FM23
Taxation of the fishing industry

Can a 'feasible' rent collector earn his hire?

ID paper: 268

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Price instruments are rarely seen in fisheries despite their many desirable properties. In this paper, I find new reasons to favor price instruments in a fishery. Given constraints on information and enforcement precluding the optimum optimorum, I consider a second-best but welfare improving policy when catch limits cannot be enforced and there are insufficient data to reliably estimate biological and technological parameters. I develop a 'feasible' tax for heterogeneous fishing grounds requiring only random observations on catches, prices and effort. Through simulations, I evaluate the performance of the 'feasible' tax relative to fishery-statistics based management policies. I calculate 'feasible' taxes using harvest and effort data from Gulf of California Mangrove-associated species. The short panel data demonstrate spatial variability in revenue-per-unit-effort. This variation is best explained empirically by Mangrove variability. The 'feasible' tax exploits spatial variation in fish stock productivity as a function of the natural capital input, Mangrove-fringe length. Using a standard bioeconomic model calibrated to these data, I use computer simulations of bioeconomic equilibria to revisit Samuelson's rent collector and ask: how much of the rent collector's earnings must be transferred to labor for labor to favor the policy?

Fisheries subsidies and their implications, case studies of fuel subsidy programs in taiwan and vietnam

ID paper: 334

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In recent years, WTO constantly focuses on fishery subsidy negotiations, and since the Non-actionable subsidies have been cancelled, fishery subsidies norm is still hard to reach a consensus. Although the WTO president drafted a list of prohibitive subsidies in 2008, they have been implementing widely in most countries, especially the vessel fuel subsidy programs. While Taiwan has implemented for a long time the vessel fuel subsidy program made the fishermen depend on it as an annual aid, Vietnam has shown several disadvantages in fishery management after the first application of fuel price supporting for its fishing fleet. This research studied fuel subsidies programs in two countries Taiwan and Vietnam, examined its impacts on management policy and adjustments to fisheries in conformity with the countermeasure. Currently, most countries treated the fuel subsidy as a negative policy. The 7th Meeting of Ministers just finished in Geneva in December 2009, most delegates claimed that Doha round negotiation should be finished in the year 2010. With this, phasing out or reducing the fuel subsidy may be implemented in 2013. In order to release the pressure on fishermen's livelihood and apply adjustments earlier, the government can encourage the retirement on aged vessel, and reward suspension of fishing activities, energy-conservation, safe and small-scale fishery. In addition, government can also consider a more elastic category of fishing activities, or discourage the subsidy on production support or the structural safety net by supporting the fishermen income. Finally, in order to provide more rooms for negotiating in WTO, it is necessary to continue data collection on other countries fishery subsidies policy and adjust the timing and contents publicized.

Fisheries management/FM24
Subsidies to the fishing industry

Profit or loss? The extent of subsidisation in the EU fishing fleet

ID paper: 357

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The 2010 Annual Economic Report (AER) on the European Union (EU) fishing fleet, due for publication in the summer of 2010, will provide the most comprehensive overview to date on the structure and economic performance of the EU Member States fishing fleets. For the first time, the data used to compile all the various analyses contained within the report will be collected under the Data Collection Framework (DCF). The economic component of the new DCF is a significant improvement compared to its predecessor (the Data Collection Regulation (DCR)), at least in terms of parameter definitions and suggested calculation methodologies, which in turn should improve the quality of the analyses undertaken. In addition to presenting the key findings of the 2010 AER, this paper will pay particular attention to the impact of income subsidies on the profitability of the sector. In 2007, the EU fleet (excluding Portuguese and Spanish fleets) is reported to have generated combined profits of around 865 million Euros (cf. 2009 AER). However, the recent EC green paper on the future of the Common Fisheries Policy (CFP) reform states that most of Europe s fishing fleets are either running losses or returning low profits . As a result of the introduction of the DCF, the 2010 AER should, for the first time, include new data on the amount of direct subsidies received by each Member State s fishing fleet. The availability of this information will give a much clearer picture of the real level of profitability in the EU fleet and will undoubtedly have significant policy implications.

The irish orange roughy fishery: an economic analysis

ID paper: 399

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An Irish deep water fishery began in 2001 for orange roughy in the Northeast Atlantic aided by government grants. The fishery experienced the rapid boom and bust of many deep water fisheries. Landings peaked in 2002 and then dropped significantly the following year. Many vessels were forced out of the fishery due to high costs and rapidly declining stocks. By 2005 the fishery was largely closed. This study highlights the need to balance the benefits of a fishery against the costs and illustrates the potential negative impact of subsidies. We present how the fishery began and it no longer exists. A bioeconomic model is applied to the available data to assess the open access effort and harvest with and without government grant aid. The results suggest that in the absence of grants, deep water trawling would not have been viable. In addition to the financial costs such as high fuel consumption, there are also external costs and user costs involved. Orange roughy is closely associated with deep water ecosystems such as seamounts and cold water corals. We discuss the costs of damage to cold water corals. These costs include the loss of fish habitats and lost future use and preservations values.

Fisheries management/FM24
Subsidies to the fishing industry

Estimating the impact of cost-reducing and capacity-enhancing fisheries subsidies cuts on the small island economy of the azores

ID paper: 419

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A major problem affecting world fisheries today is overcapacity of which overfishing is both a cause and a consequence. Subsidies are now widely perceived as an underlying cause of overcapacity, the negative environmental, social and economic effects of which can be masked by increasing support from the government. Subsidies that reduce the costs of fishing and increase profits for the industry can insulate fishers from economic signals, countering the economic incentive to stop fishing when it is unprofitable. Subsidies can thus be a major impediment to achieving economically productive fisheries, particularly in the absence of effective management systems. It is thus ironic that the dual crisis of overfishing and overcapacity is usually generated by the management system itself. Despite continued effort, fleet overcapacity continues to be the fundamental problem of the European Unions Common Fisheries Policy (CFP). Capacity reduction schemes, such as buy-back programs, have not been very effective since generally only the least efficient vessels are bought up, leaving total fishing capacity largely intact. On the other hand, vessel construction subsidies and modernisation schemes are also particularly damaging, helping to reduce operating costs and further increase the economic incentives underlying overcapacity. Fuel price support is another type of subsidy reducing the operating costs particularly since fuel constitutes a significant component of fishing costs, contributing up to 60 percent in some fisheries. By reducing operating costs and thus enabling an increase in fishing effort, fuel subsidies are contributing to increasing fishing pressure and overexploitation of fish stocks. As a result, fuel subsidies support economically unprofitable practices that undermine future economic benefits. A long-term approach is needed that encompasses more fundamental changes than using more efficient engines that initially reduce fuel consumption but in the long-run worsen the situation by contributing to increasing fishing effort on already overexploited stocks. In this view and on account of the global fisheries crises and highly subsidised fisheries, this study aims at estimating the impact of eliminating cost-reducing and capacity-enhancing fisheries subsidies on the Azorean economy. In particular, this study sets out to measure the impact of such a shock on various macro and micro variables pertaining to the regional economy using a dynamic CGE model based on a SAM for the Azores.

Rethinking of co-management in small scale fishery in Sri Lanka ?

ID paper: 67

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A lot of efforts through different projects have been made to establish co-management mechanisms to manage small scale fishery in Sri Lanka. Nevertheless, many of such attempts have by now proved to be futile endeavors. More often than not, such attempts to establish co-management mechanisms in small scale fishery in Sri Lanka has made the situation worse. Collapse of community institutions and increased conflicts are some of the prominent outcomes .This paper analyzes experiences and lessons of such established co-management mechanisms in small scale fishery, in an attempt to rethink of applying co-management in Sri Lanka.

Fisheries management/FM25
Fisheries co-management

Co-management and rights-based approach to fisheries governance-lessons from Bangladesh

ID paper: 209

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Abstract This paper is based on a review and assessment of lessons from three projects on fisheries co-management in Bangladesh: i) Community-based fisheries management (CBFM), ii) Management of aquatic ecosystems through community husbandry (MACH), and iii) Fourth Fisheries Project (FFP). These co-management initiatives established 191 Community Based Organizations (CBOs) in 179 water bodies. The review shows that most lessons learned relate to institutions, governance, access rights and the effectiveness of fisheries management measures such as creation of sanctuaries. In most sites, rights-based approaches dominated fisheries management arrangements and enhanced the sustainability of fisheries through agreed measures. The review shows however that these projects were not as successful institutionally as they were in terms of fish production and cost effectiveness. The review also indicates that improved knowledge provided for better management, and that fishers already know the importance of fisheries resources. This makes it possible for communities to take charge of the responsible management and harvest of fishes from their water bodies. Community leaders can function well as leaders of groups of fishers wherever they act transparently and maintain good relationships with local administration. However, the review shows that these initiatives were not a complete triumph in terms of generating policy shifts amongst government bodies. The review reveals that transfers of responsibilities have occurred as a result of the community-management approach, increasing the role of the fishers in the overall application of the fisheries management. Responsibility for participatory monitoring of Community Based Organizations (CBOs) has enabled fishers to defend their legal rights to protect water bodies from traditional lease holders.
Key words - community based organizations; co-management; community-based fisheries management; jalmahals; Bangladesh

Choice of organization managing and utilizing Japanese coastal resources using AHP technique

ID paper: 309

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In Japan, common fishery rights are granted by prefectural governor only to local fisheries cooperative associations (FCAs). Coastal resources like abalones are utilized by local fishers as members of FCAs. Fishery rights are deemed to be real rights and any person encroaching upon this right is subject to fine. Therefore, common fishery rights should be granted to proper organization under the understanding of the public citizens. I gathered replies from 800 citizens to a questionnaire via the internet and applied the analytic hierarchy process (AHP) in group-decision to select proper organization. The decision goal is to choose the most suitable organization to manage and utilize coastal resources like abalones and etc. Factors to be considered (criteria) are seafood's (1)stability in supply and quality, (2)low price, (3)brand image and (4)legality in resource utilization. Alternative organizations to be chosen are (a)administrative body, (b)cooperative association, (c)private company and (d)illegal organization. The criteria are pair-wise compared to how important they are, and points of priority are calculated as (4) is highest, followed by (1). The 4 candidates of organization are compared with respect to each above criterion. With respect to criteria (1), (2) and (3), (b) is highly regarded, and only in criterion (4), (a) is highest. According to the judgments through procedure of synthesizing, (b) is regarded as the most suitable organization followed by (a). This result shows that the Japanese public citizens have understood the situation of coastal fisheries and community based co-management on coastal resources so far.

Fisheries management/FM25
Fisheries co-management

Co-management : the most efficient and effective management solution for fisheries of small side reservoir

ID paper: 182

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Thousands of small man-maid water reservoirs (water bodies with water surface from 5 to some hundreds ha) have been developed in mountainous regions for water supplying or hydroelectricity purpose, these areas are usually residence of poor, backward minority groups which often lacks of food supplying resources. Development of fisheries (both of fishery and farming or ranching)bring them both economic and socio-economic benefit. However to manage the fisheries there always meet some troubles and conflicts in water usage, stable water supplement, and sustainable development of fisheries resources in context of free approach Studying the management at Tam Hoa reservoir in Bac Son district, Lang Son of Viet Nam- the reservoir lying in the backward Tay minority region in North of Vietnam, many lesions about benefit of sharing benefit and responsibility between communities who concerns the reservoir as common asset and used water resource for different purposes. The sharing rights and responsibilities between government authorities and local communities in development of fisheries thru the cooperative model combining with the traditions and customers of community brings very good success in fisheries management of this reservoir. Thanks applying of co-management, the fisheries resources in this reservoir are protected and developed sustainable and maid benefit not only for fishers but positively impacted to the ecological environment and contributed to economic and cultural development of the region and poverty elimination for local minority groups The experience of co-management of Tam Hoa reservoir is very useful for searching the adaptable for thousands of small man-maid water reservoir in Viet Nam as well as in other countries.

Co-management in capture fisheries is the effective way of establishing property rights of the poor fisher in Bangladesh

ID paper: 320

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The study is a modest attempt of assessing community-based management of inland fisheries resources in Bangladesh to establishing access right to the poor fishing communities. Co-management initiatives undertaken by different institutes have established effective networking among Community Based Organizations (CBOs). The initiatives also provided fisheries management knowledge and created access to finance. Since the country is endowed with enormous inland open water fisheries, development of local institutions is a prime task. However, establishment of access to waterbodies is not easy as government policies favored powerful elites and local politicians. Diverse types of waterbodies and related policies hindered successful fisheries management. Community Based Fisheries Management (CBFM) approaches proved to establish friendly local institution which, can access to resources, finance, skills and income. The present study employed management information from a range of different CBFM projects covered more than 300 waterbodies in different geographic location from 1996 to 2008. This paper focuses on the lessons, cage studies and challenges of CBFM initiatives. The sustainable resources management, which is part and parcel of the CBFM approach, has led to document environmental degradation, in comparison to current indiscriminating over exploitation practices. This paper describes distributional pattern of benefit depends on the strength and appropriateness of the institutions, attitudes and social capital created for all categories of stakeholders within the co-management approach. The paper concluded with the appropriateness of different factors effecting co-management initiatives in the open water fisheries management in Bangladesh.

Fish and food security: trading global growth for malnutrition of the poor?

Food security (short title)

The role of fish for food and nutrition security: a review

ID paper: 497

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Much of fish consumed by the poor are caught by household members and traded in local markets. These fish trades are rarely or poorly included in national statistics, and it is therefore difficult to estimate precisely the real contribution of fish to food and nutrition security. The WorldFish Center recently completed a global review on the role of fish for food and nutrition security of the poor in low-income countries. This presentation will synthesize the main findings of this research, highlighting the pathways through which fish can contribute to food and nutrition security. For this, both small-scale fisheries and aquaculture sectors are considered. The presentation also discusses the methodology as to how we can statistically demonstrate the contributions of fish to food and nutrition security.

Food security/ ID 74
Food security

Aquaculture and Food Security can Fish farming fill the Gap?

ID paper: 498

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While aquaculture has provided economic and nutritional benefits to millions, there are concerns that unconstrained sector expansion and intensification, coupled with its ecological and social impacts, globalization of markets, and climate change, may have undesirable impacts on the resilience of social-ecological systems. A significant part of the aquaculture expansion is expected to occur in coastal areas, where it directly affects resource systems already experiencing large pressure from human activities. Thus, there is a risk that the anticipated benefits from aquaculture may come at the expense of increased pressure on coastal ecosystem services, thus jeopardizing coastal people s food security and livelihoods. Further, intensification may also indirectly increase the dependence on marine ecosystems through usage of fish resources as feeds. The practice of intensive farming of fish and crustaceans is characterised by inputs of high quality resources and energy and release of effluents. The industry continues to improve performance through research on food development and system designs, and recent initiative the Aquaculture dialogue attempts to identify sustainability criteria for a selection of cultured species. In addition FAO have recently moved beyond their earlier established code of conducts and are now developing a broader systematic perspective on aquaculture, i.e. Ecosystem approach to aquaculture . This presentation will discuss how aquaculture may impact on social-ecological resilience, more broadly and also in connection to coastal aquaculture development, and specifically considers the intensification of production methods. In connection to this some recent sustainability tools/indicators will briefly be discussed out from this perspective.

Assessing the progress on fish and food security in Peru

ID paper: 520

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In Peru, the fisheries are characterized by a strong fishmeal industry. The species used for fishmeal production is mainly anchovy and also some other small pelagic species. There is some concern that an excellent source of food is used for a product not directly going for human consumption. Since several years the Peruvian government has put an emphasis on the promotion of small pelagic species for human consumption. One decade ago, a FAO project was implemented, trying to promote the usage of anchovies in direct consumption. The project included several activities such as school feeding, recipes, market promotion, and product development. This paper presents the promising results of these various initiatives but also highlights the remaining challenges faced by the Peruvian government to further promote the use of small pelagic species for human consumption.

Food security/ ID 74
Food security

Dollars, Work and Food: Understanding dependency on the fisheries and aquaculture sector.

ID paper: 517

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In many developing countries the fisheries and aquaculture sector is a vital source of food, foreign exchange earnings and employment. We examine the concept of fishery dependency and develop indicators that capture its multi-dimensional meaning at the national level. These indicators allow both the development of national dependency profiles as well as cross-country comparisons. A study of 17 countries reveals that reliance on global databases often leads to an undervaluation of a country s actual dependency of fisheries. The study s aim is to better understand the nature of fishery dependency and the critical role it plays in determining countries vulnerability from a food security stand point. This will aid management, planning and policy measures aimed at maintaining and improving food security.

Environmental, ecological and economic considerations in the conservation and management of forage fish

Forage fish (Short title)

Strictly for the birds? a note on the ecosystem effects of the collapse of the pacific sardine

ID paper: 489

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In the 1950s the Pacific sardine collapsed, and the fishery declined from a historical peak of over 600,000 metric tons in 1936 to less than 100,000 tons after 1951 and was virtually nonexistent for 25 years (1965-90). Despite this, the landings of sardine predators increased after the sardine collapse and fell as the sardine stock recovered. Using an error correction model it is nevertheless possible to identify individual species on which the sardine collapse has a discernible and expected effect. According to this, the landings of seven species (barracuda, bluefin tuna, giant sea bass, sheephead, skipjack tuna, white sea bass, and yellowtail) can be expected to decline with the sardine stock, but the effects are small. It is hypothesized that variations in the sardine stock mainly affects non-commercial predators such as marine mammals and especially sea birds. This poses severe challenges to an ecosystem-based management of the sardine fishery.

Forage Fish/ ID 52
Forage Fish

Cointegration: a tool for ecosystem-based conservation and management of fisheries

ID paper: 491

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Species within marine ecosystems are known to be interconnected. This is a result of many factors including predation and competition for resources. Despite this, many fisheries are still managed using a single species framework. This paper uses cointegration analysis to quantify the relationship between different fish species. Cointegration is a method for examining how time series variables that are integrated (e.g., I(0) or long memory fractional) and move together. Using data from Northern Anchovy, Pacific Sardines, and Albacore Tuna off the California coast, a vector error correction model is estimated which shows a statistically significant relationship between anchovy and tuna harvests. Results suggest financial gains from accounting for external effects between these two fisheries and provide an economic justification for ecosystem based management.

Analysis of price response in the u.s. pacific sardine fishery

ID paper: 499

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This research investigates the ex-vessel price flexibility of U.S. Pacific sardine landings using a price response analytical framework. Under perfectly competitive market conditions, we would expect to observe an inverse relationship between the average price and the aggregate quantity supplied. However, affiliations between U.S. Pacific sardine harvesters and processors, as well as sardines being traded as a global commodity are factors that may confound this relationship. Preliminary results from our analysis reveal that the ex-vessel price of sardines is relatively unresponsive to changes in the quantity landed. With price inflexibility and recent declines in the annual sardine harvest guideline, if harvest costs do not decrease with the decrease in landings, rents will decrease as well. Under current derby fishing conditions in the Pacific sardine fishery harvest costs are likely to increase if a continued reduction in the harvest guideline intensifies the race for fish. This situation becomes even bleaker without a corresponding increase in ex-vessel price as a result of the decrease in landings. We consider how these circumstances might be improved under rights-based management of the fishery.

Forage Fish/ ID 52
Forage Fish

The effect of the environment on california s commercial fisheries

ID paper: 500

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Long-term, naturally occurring cycles can cause significant shifts in marine ecosystems referred to as regime shifts . While the new regime can be as diverse and ecologically acceptable as that which it replaced, individual species may completely disappear or be greatly depressed when a regime shift occurs. In this work we examine an 80 year time series of California commercial fishery landings during which time the California current has been observed to shift from a warm to a cold then back to a warm regime. This period also captures the heyday of the U.S. Pacific sardine fishery in the 1930s, its collapse and its subsequent reemergence in the 1990s. We observe major changes in the species composition of commercial landings over this period and relate these changes to changes in the environment as expressed through changes in the forage base. Our initial findings suggest that while aggregate biomass may not be greatly affected by a regime shift, there can be significant changes in the operations of fisheries and in the economic value they generate.

An integrated economic-ecological framework for ecosystem-based management of fisheries in new england

ID paper: 504

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We present the outlines of an integrated economic-ecological framework designed to help assess the implementation of the ecosystem-based management (EBM) of fisheries in New England. We develop the framework by linking a computable general equilibrium (CGE) model of a coastal economy to a bottom-up model of a marine food web for Georges Bank. We focus on the New England region using coastal county economic data for a restricted set of industry sectors and marine ecological data for three top level food web components: planktivores, benthivores, and piscivores. We undertake numerical simulations to model the welfare effects of changes in alternative combinations of species (or guild) yields and alternative manifestations of biological productivity. We estimate the distributional effects of alternative simulations across a range of consumer income levels. This framework could be used to extend existing methodologies for assessing the impacts on human communities of groundfish stock rebuilding strategies, such as the imminent sector management program in the US northeast fishery management region. We discuss other possible applications of and modifications and limitations to the framework.

Forage Fish/ ID 52
Forage Fish

Fishing games under climate variability: transboundary management of pacific sardine in the california current system

ID paper: 502

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Pacific sardine (Sardinops sagax), which is a transboundary resource targeted by Mexican, U.S. and Canadian fisheries, has exhibited extreme decadal variability in its abundance and geographic distribution corresponding to water temperature regime shifts within the California Current Ecosystem. Our study develops a three-agent bioeconomic framework that incorporates environmental effects on sardine abundance and biomass distribution. Simulations are conducted to evaluate the conservation and economic benefits of various management strategies for the time variant/asymmetric shares of the Pacific sardine resource by three countries.

Characterization of the california live bait fishery

ID paper: 501

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Conservation and management of North American West Coast fisheries encompass a broad array of issues including the economic, spatial, and temporal relations between the coastal pelagic species live bait fishery and the highly migratory species recreational fishery. For the better part the century, the live bait fishery has supplied live bait to the commercial passenger fishing vessel (CPFV) fleet and private recreational anglers. Live bait consists primarily of small coastal pelagic species such as sardine, anchovy, and squid. The use of live bait in the recreational targeting of high value HMS species, such as albacore tuna, yellowtail tuna, bluefin tuna, marlin, and dolphin fish and the established nature of the live bait fishery's infrastructure differentiate the Southern California saltwater recreational fishery from other fisheries. Given its unique position on the interface between the coastal pelagic and highly migratory species fisheries, the live bait fishery finds itself at the nexus of conservation and management issues between both fisheries. Resource managers and industry have expressed interest in increasing the understanding and documentation of the fleet and in developing economic measures of the fleet's value and its contribution to the Southern California recreational fishery. This presentation lays the groundwork for economic research through the presentation of brief history and empirical characterization of the live bait fleet and its role in the recreational fishery.

Forage fish in the california current large marine ecosystem: ecological linkages, current catches and values

ID paper: 507

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I begin my talk by identifying the fish species that inhabit the California Current Large Marine ecosystem (CCLME). Next, I categorize these species into predator-prey and forage and non-forage fishes. I then present the current catches, landed values, payment to labour (wages), capital (profit) and payment to the resource owners (resource rent) from the forage and non-forage species in the CCLME. The goal of this contribution is to lay the foundation for developing an ecosystem-economic model of the CCLME to determine the optimal use of forage fishes in the ecosystem.

A preliminary ecosystem assessment for Atlantic sea herring (Clupea harengus): ageneral equilibrium framework

ID paper: 514

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Interest in ecosystem-based management or the ecosystem-based approach to fisheries management has rapidly increased on a global basis. Most options for ecosystem-based management have emphasized some type of biological and natural conservation or non-use, and minimal attention has been given to assessing the social and economic ramifications of ecosystem-based management. We offer a framework for assessing the economic ramifications of an ecosystem-based approach to fisheries management, using an input/output (I/O) optimization (IOLP) model, and apply the model to the Atlantic sea herring (Clupea harengus) fishery in New England. The I/O model is based on IMPLAN, an off the shelf software package for input/output modelling by county, state, region, or the United States. A linear programming problem is specified for the three digit NAICS sectors in which total output or production is maximized subject to the inputs used and purchased by each NAICS sector. In addition to the standard NAICS sectors, we specify a sector for the herring fishery and a sector for all other fisheries of the region (i.e., an aggregate or composite of all other fisheries). We then include consumption and constraints related to predators. As such, the model may be considered a limited general equilibrium model in which the limitations are imposed by various constraints and assumptions (e.g., constant prices, fixed proportions in input usage, and zero substitution possibilities).

Global fisheries contribution to national economies: Management and policy options for rebuilding

Global ocean fisheries (Short title)

Current worldwide contribution of marine fish to human welfare

ID paper: 506

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Some attempts have been made in the past to provide estimates of the value of global fisheries. For example, catch values from marine fisheries have been reported by the FAO (2008) and Sumaila et al. (2007). The World Bank (2008) estimated that current economic rent from the world s fisheries is negative $5 billion, and that if managed optimally, marine fisheries are capable of delivering economic rents of $50 billion a year. Here, we provide a more comprehensive estimate of the contribution of marine fish to human welfare, which is defined narrowly to mean the sum of worldwide (i) income to workers in the marine fishing sector; (ii) profits to fishing enterprises; and (iii) resource rent to citizens of the world, who, according to national and international laws and rules, are the owners of marine fish stocks. This definition means that our estimate of the contribution of marine fisheries to human welfare is conservative since it does not include all values. For example, the added value through the fish chain and non-market values are not counted. Still, our approach is a step forward towards determining more comprehensive estimates of the contribution of marine fisheries to human welfare. To carry out the objective of the paper, we relied on a diverse range of global fisheries databases created by the Sea Around Us (www.seaaroundus.org) and the Fisheries Economics Research Unit (www.feru.org). These include a global (i) catch database (Watson et al. 2005?); (ii) ex-vessel fish price database (Sumaila et al. 2007); (iii) subsidies database (Sumaila and Pauly, 2006); (iv) cost of fishing database (Lam et al., 2010); and (v) fisheries jobs database (Teh and Sumaila 2010).

Potential contribution of global marine fishery resources to human welfare

ID paper: 509

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We combine information from several global fisheries databases including those from the Sea Around Us Project (www.seaaroundus.org) and the Fisheries Economics Research Unit (http://feru.org) to project the future potential gains in human welfare under the assumption that (i) global fisheries continue the current declining trend observed over the last several decades; and (ii) the global community succeeds in doing what it takes to rebuild global fisheries in such a way that they may be described as sustainable, where the potential maximum catch from ocean fish populations are attained through time. Often, fisheries managers feel pressure to sacrifice the long term health of marine fish resources in favor of short term economic needs of the fishing industry and consumers. By estimating the potential contribution of global marine fisheries to human welfare, the current study seeks to motivate the public and policy makers alike to develop sound policies aimed at protecting the oceans of the world, supporting sustainable activities, and therefore the communities that depend on them.

The way forward

ID paper: 519

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The research of the GOEP to date supports the conclusions of the World Bank, the FAO and the OECD that there has been extensive overexploitation of world capture fishery resources, and further that these resources have the, as of yet, unrealized potential of making a substantial contribution to world income. Achievement of this potential involves undertaking a massive resource investment program, and doing so in recognition of the fundamental proposition that virtually all investment entails incurring a current cost in the hope of a future, but uncertain, payoff. This paper will discuss some of the key issues to be researched by the GOEP, in collaboration with other organizations, such as the OECD, in moving forward to develop an optimal resource investment program.

Global ocean fisheries/ ID 44
Global ocean fisheries

Panel discussion

Global economics of tuna fisheries

Global Tuna (Short title)

Tuna price in response to changes of market structure and ecosystem conditions - price linkage between hawaii and japanese tuna sashimi markets

ID paper: 271

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The objective of this research is twofold. First, this study uses a cointegration model to investigate possible potential long-run pricing relationships among the major landings of the Hawaii tuna longline fishery (bigeye, yellowfin, skipjack, and albacore tuna). This analysis will determine to what extent changes in the price of one species might impact prices of others in the Hawaii tuna auction market. Second, a Multivariate Markov-switching autoregressive model is used to identify regime shifts and price responses in Hawaiian bigeye and yellowfin tuna prices in relation to their own landings, explore potential price linkages with tuna sashimi prices in Japan, and examine the possible effect of changing tuna quality (such as the fat content) due to seasonal changes in sea surface temperature on the major fishing grounds. In addition, this study intends to evaluate the market effects of ENSO (El Niño/Southern Oscillation) cycles on prices. The price of fish is directly associated with fishers income, and income to fishers (and in turn, the dynamics of the fleet) might be influenced by both the availability of resources and price levels. This research advances our understanding of the dynamics of global tuna fisheries by providing a vital bridge between human and natural elements in support of an ecosystem approach to management.

Bargaining solutions for access to straddling and migratory tuna stocks between pacific island countries and distant water fishing nations

ID paper: 339

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Three species of migratory tropical tuna (bigeye, yellowfin and skipjack) are concentrated in the Western and central Pacific Ocean in high seas areas, and in exclusive economic zones (EEZs) of relatively poor Pacific Island Countries (PICs). The nations harvesting the stocks are relatively prosperous Distant Water Fishing Nations (DWFNs), catching young near-surface tuna by purse-seining, or older, deeper-moving, tuna by longlining. The rents accruing to the PICs are modelled assuming they act cooperatively to charge the same fees for harvesting access to the fish stocks in their EEZs, to all DWFNs. The PICs would set the fees so as to maximise their combined fee income, taking account of the DWFNs harvesting response. At present the PICs mainly individually enter into bilateral agreements on access fees and other issues with DWFNs. The current total fee income received by the PICs appears to be much lower than what it could be. The bargaining system has advantages of transparency and no discrimination on access fees between DWFNs, making it likely that the process would be accepted as fair. On the other hand, the total economic rent generated is lower than the maximum possible, because fleets face different effort costs and tuna prices, and the PICs exert some monopoly power. A simple age-structured model of the three tuna species is used to find steady state solutions of DWFN activity. Total rent under bargaining is compared with the maximum attainable total rent.

Artisanal fisheries and consequences of the international trade of bluefin tuna

ID paper: 345

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There has been significant growth in the catches of bluefin tuna in the Atlantic Ocean and especially in the Mediterranean Sea for the last decade due to the expansion of fattening farms which export their production to Japan. There has been an increase in catches due to strong demand and, consequently, it has produced a degree of exploitation of the stock. According to ICCAT, this could cause the extinction of the resource, and as a result recommendations have been made. For this reason, the European Union has imposed drastic cuts in TACs, which have affected not only the purse-seining fishing fleet which was supplying tuna to farms, but also the artisanal fleet segments which continue ancient fishing activities such as the tuna traps in the South of Spain. In this paper the current situation of this sector is presented in detail. The existing interrelationships between the profitability of firms and catches and, above all, between the profitability of firms and the situation of the bluefin tuna demand in the Japanese market are analysed. This is because this market determines the price obtained by tuna trap firms. This price is established by Japanese wholesalers at the beginning of each fishing season.

Asymmetric externalities of the tuna longline and tuna purse-seine fisheries in the eastern pacific ocean

ID paper: 436

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Paper scheduled to present in the Special Session: Global economics of tuna fisheries Two of the three important species of tropical tunas in the eastern Pacific Ocean (EPO), bigeye and yellowfin, are exploited by purse-seine and longline gear. The third species, skipjack, is exploited almost entirely by purse-seine gear. Most of the bigeye and yellowfin caught by purse-seine gear are rather small (roughly 5 to 20 kg), whereas virtually all of those caught by longline gear are larger. If the catches of small fish could be reduced, the total catches of those two species would presumably be greater. It might seem that the fishery could be better managed by curtailing purse-seine fishing on tunas, but that would create several problems. The economic and biological trade-offs that might be considered are discussed in this paper. Recent studies by the IATTC staff have shown that the fish-carrying capacity (which is approximately proportional to fishing capacity) of the purse-seine fleet in the EPO could be reduced from its 2009 level of 209 thousand m3 to about 158 thousand m3 without reducing the catches of tunas. Assuming that both purse-seine and longline fishing mortality could be reduced effectively to achieve the recommended spawning biomass of bigeye in the EPO, a sensitivity analysis was conducted to show how to reach a greater sustainable yield based on the results of three rights-based management decision rules on the catches, abundances, and gains and losses of value of bigeye, yellowfin, and skipjack tuna. This study shows that the most recent IATTC resolution concerning fishing capacity, which constrains the management measures to reduce both longline and purse-seine fishing effort proportionally, would not maximize the total values of the catches in the EPO in the long run. If the catches of juvenile bigeye by purse seiners making sets on floating objects were reduced, the catches of adult bigeye by longline gear would increase and the values of the catches of bigeye would increase even more because much higher prices are paid for longline-caught bigeye. Furthermore, the increased abundance of sexually-mature bigeye would decrease the likelihood of decreased recruitment of that species. In order to resolve the conflicts of interest among different countries and fishing gears in utilizing the tuna resources, this study proposes the establishment of a compensation scheme to create incentives to purse-seine fishermen to reduce their catches of juvenile bigeye and yellowfin tuna in order to increase the abundance of larger, sexually-mature fish and the total revenue generated by the combined purse-seine and longline fisheries.

Turning a fish into a brand: a century of rent-seeking strategies in the tuna canning industry

ID paper: 526

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García del Hoyo Juan José, MEMPES, University of Huelva, Spain
Guillotreau Patrice, LEMNA, University of Nantes, France
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Over the past century, the tuna canning industry has been dominated by a few big companies, some of them having changed of ownership or merged: these oligopolistic firms are the “big three” in the USA, *Van Camp*, *Star Kist*, and *Bumble Bee*, the French *Saupiquet*, the Italian *Trinity Alimentary* and the Spanish *Calvo* in Europe, and, a bit later, the Thailandese groups *Thai Union* and *Sea Value*. Specialized in the canning of seafood, if not exclusively in tuna canning, these firms are key operators on the international markets for raw material or processed products and benefit from the reputation of their private brands. This paper depicts the history of the world tuna canning industry throughout the past century, providing a synthesis of the abundant but dispersed literature on the subject, with an emphasis on the major companies of this industry. An analytical framework is proposed, mixing up some evidence regarding the rent-seeking strategies followed by leading companies and the various forms of rents which have been identified in the literature by both fisheries and business economists: resource scarcity rent, infra-marginal rent of producers (productivity rent), technological rent (increasing returns to scale and innovations in the fishing and processing industries), quasi-monopoly rent or reputation rent (due to the horizontal differentiation from advertising) and organisational rent (in relation to the new international division of labour). The discussion suggests that the basic principles of fisheries sustainable management are somehow challenged by the economic objectives of an industry enjoying such a variety of rents.

Global Tuna/ ID 39
Global Tuna

On the maximum economic yield for the wcp tuna fisheries

ID paper:

Grafton R.Q. et al.

This paper uses an age-structured bioeconomic model to estimate maximum economic yield for purse seine, longline, and pole and line fleets in the Western and Central Pacific. The paper compares dynamic biomass and maximum economic yield and standard approaches to demonstrate the importance of the marginal stock effect and that maximum economic yield provides a biomass larger than that of maximum sustainable yield.

Shadow price of bigeye in global tuna fisheries

ID paper:

In this paper we analyze the production process of the tuna purse seine fisheries in the Western and Central Pacific, Eastern Pacific, and Indian Oceans using vessel-level data and a multi-output, stochastic translog directional distance function. We find that juvenile bigeye, which are largely not targeted species and until the recent history of the fishery were entirely discarded, have negative average shadow prices In all three fisheries. The output elasticity of bigeye when imposing homogeneity of degree 1 in outputs ranges from -0.02 (Eastern Pacific Ocean) to -0.08 (French fleet, Indian Ocean).This paper contributes to the recent debates on the optimal harvesting of bigeye. Recent studies have shown that incomplete property rights and the highly migratory nature of tuna have led to an externality where purse seiners remove bigeye from the fishery at the juvenile stage, potentially lowering the abundance of mature bigeye targeted by longliners and causing a reduction in revenue. This paper suggests that purse seiners would also benefit from a reduction in bigeye catch. While bigeye are not freely disposable in the production sense, some research, such as on optimal FAD depth, suggests that bigeye catch could be lowered without much overall reduction in output. This paper may inform the decisions of purse seiners in adopting new technologies or management while attempting to maintain profitability.

Global Tuna/ ID 39
Global Tuna

Asset ownership, climate variability and policy design: game theoretic insights on tuna management outcomes

ID paper: 524

Miller, Kathleen
Golubtsov, Peter
McKelvey, Robert

Tuna fisheries around the world are governed by Regional Fishery Management Organizations (RFMOs), whose membership includes both harvesting nations and nations in whose waters the targeted fish populations reside. The outcomes of the policies established by an RFMO will depend on subsequent interactions among the fleets, the fishing sites and the RFMO itself – an interplay that can be formally modeled as a multi-party harvesting and management game. This paper uses such a model to explore the consequences of alternative policies that might be pursued by the Western and Central Pacific Fishery Commission in its efforts to manage fisheries for tropical tuna in that region. The analysis indicates that while the RFMO can achieve any given biological objective by in a variety of ways, different types of policies will have very different implications for who benefits from the policy as well as for the overall level of the economic returns that can be obtained under the policy. Furthermore, policy outcomes will vary considerably depending on whether or not coalitions form among the various fishing nations and coastal nations in whose waters harvesting occurs. In addition, climate-related shifts in the distribution of the stocks between EEZ's and the high seas can affect the biological and economic consequences of the RFMO policy choices. Recent policy developments in the region are evaluated in light of insights from model simulations.

Bioeconomic modeling and management of the southern bluefin tuna fishery

ID paper:

Campbell, Harry, University of Queensland
Kennedy, John, La Trobe University

This paper reviews several different bioeconomic models of the Southern Bluefin Tuna fishery and discusses the management implications. One conclusion is on the need to be cautious when using the results of bioeconomic models in managing the fishery. The model results suggested that, to further both the economic and conservation objectives, the combined CCSBT annual catch quota needed to be cut from its present level of around 15,000 tonnes to a level closer to the combined catch levels under the other more favourable regimes, which are all well below 10,000 tonnes per annum. This is consistent with the CCSBT recommendation that “the global SBT catch should be reduced to 9,930t for 2006, which corresponds to a 5,000 tonne reduction in the assumed global catch of 14,930t for 2004 and 2005" (CCSBT (2005), excerpt from paragraph 37).

Global Tuna/ID39
Global Tuna

Panel discussion

Special session

Integrated modelling approach of social and environmental interactions in support to marine resources management

Integrated modelling (Short title)

Ecological impact, sustainability and socio-economic analysis of long line mussel-farming in the gulf of trieste

ID paper: 63

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Mussels aquaculture is a relevant activity for the fishery sector of the North Adriatic. Around 15 km of coastal water of the Gulf of Trieste, Italy, are used for the mussel long line farming, for a production of about 5000 tonn/year. The aim of this work is to assess sustainability of this activity in a Ecological-Socio-Economical (ESE) perspective by evaluating the role of mussels farming in the socio economic system and in the ecological system. A socio economic analysis has been conducted involving local stakeholders in meetings, and also by contacting them with bilateral interviews and questionnaires. Results of questionners, together with mussels production data declared at the Sanitary authority, and official economic data, have been used quantify the economic relevance of the activity, and problems perceived by local farmers. For the ecological analysis, we monitored -on monthly basis- mussels growth and water quality parameters in 6 sites along the gulf. Feeding preference and faeces/pseudofaeces production, impact on surface sediment ad its reversibility have been investigated, too. Results have been used to calibrate a bioenergetic model representing the mussel physiology and growth in relation to environmental conditions, and the impact of mussel aquaculture on water column. The integration of the whole set of models and information will be used to give an evaluation of the ecological footprint of the activity and as a tool for coastal management.

Sustainability and socio-economic analysis of long line mussel-farming in the gulf of trieste. Tools for development of production sector

ID paper: 68

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Aquaculture and fisheries are essential resources for the agri-food production of the north Adriatic coast. In particular mussels farms occupy a large area of the gulf of Trieste. A total of 16 producers, working in small cooperatives or individually, utilize 30 vessels on the 15 km of mussels long-line along the coast. Our study intends to analyze and evaluate the sustainability of this activity also in relation to its productivity, and to contribute to development of a tool for the optimization of ecological sustainability of mussel production. The analysis of sustainability is done with the application of two different indexes: Ecological Footprint and Emergy Analysis. Emergy Analysis entails comparison of this activity with other types of aquaculture (or agriculture), which utilize different methods to obtain the same final production. The computation of Ecological Footprint, an index seldomly apply to marine systems, will highlith the dependency of mussels aquaculture in the Gulf of Trieste from other local or national resources. The evaluation is based on a data set obtained trough interviews and questionnaires submitted to the producers, which intended to evaluate the materials, technologies, methods of production, and commercial channels, and an official informations from local authorities Production data have been submitted by public structures and sales cooperatives (producers).

Evaluating the social costs of fishing activities in a deliberative perspective

ID paper: 222

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The ECOST project aims to develop a new approach for the evaluation of fishing activities and policies in order to contribute to a better management of aquatic resources which affect sustainable development in coastal zones around the world. It has to be seen from the wider perspective of equipping public decision-makers and society with the appropriate tools and methods needed to take into account, not only immediate economic and social profits, but also the costs engendered by fishing activities, which relate as much to ecosystems as to societies. The novelty and originality of the suggested approach doesn t rely on the concept chosen for the analysis, the social cost, but on the way it is built and mobilised to deliberate on the evaluation of fishing activities. As Fisheries activity is a complex system, characterized by reciprocal interactions between fisheries activity and the harvested resource, it is difficult to define the effects of such activities in the society. The social cost is thus defined as an articulation between the frontiers of what is feasible? and the assessment of members of the society concerning what will be judged desirable? (O Connor 2004). We propose an evaluation process defining the performance issue related to fishery metiers, a set of indicators and a method to assess the social cost using the Kerbabel Deliberation Matrix framework.

Integrated modelling/ ID 90
Integrated modelling

Societal costs of fishing practices and fishery policies; the ecost approach

ID paper: 465

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ECOST is a research project funded by the EU that involves 23 partners spreads geographically over three regions: Africa, Asia and Caribbean (with the involvement of three countries for each region). These regions are characterised by coastal upwelling (West Africa with Guinea, Senegal and Guinea Bissau), delta (South East Asia with China, Vietnam and Thailand) and coral reef (Caribbean with Trinidad and Tobago, Jamaica and the Dominican Republic) eco-systems. In Asia, the project focuses on the estuaries of the Chao Phraya, Mekon and Pearl River. The main objective of the ECOST project is to develop a new approach for the evaluation of fishing activities and fishing policies in order to contribute to a better management of aquatic resources so as to enhance sustainable development in coastal zones around the world. For this purpose, a new methodology based on the concept of societal cost is being developed which embraces the logic of the Johannesburg Plan of Implementation (JPoI) namely to restore marine ecosystems as much as possible by 2015 - and the philosophy of the Code of Conduct for Responsible Fisheries (CCRF). Societal costs are all costs linked to fishing activities and fishery policies: these may be ecological (alteration of the capacity of a system), economic (all costs linked to production, management, subsidies and external factors) and social (the costs of poverty, social injustice, gender discrimination, and food security and food safety). The presentation seeks to present final results on the application of the ECOST model to the major fisheries in Asia, Africa and Caribbean

Fisheries and aquaculture management within the scope of system approach; a review of experiences, limits and advantages

ID paper: 527

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Fisheries and aquaculture are part of a complex system with underlying relationships between species and other activities. This calls for more integrated assessment, leaving a management based on stock assessment and single species. The ecosystem approach for fisheries management (EAF) as well as the more recent ecosystem approach to aquaculture is a logical framework developed in that way. It especially highlights the role of human aspects and the management of a range of human interactions with the fishery ecosystem (FAO 2008). But remaining centred on fisheries it can sometimes be understood in a way to manage the environment through the fisheries lens and for fisheries.More holistic and integrated approach such as system approach is complementary to EAF. By aiming at better understanding coastal system dynamics, it defines a framework allowing for integrated management and a way to explore the range of possible futures. But similarly to EAF and as an integrated assessment its implementation faces common issues such as boundaries, scale and scope.The paper examines conditions and means to complete an integrated assessment in a system approach. Through experiments implemented within the EC FP7 SPICOSA project (Science and policy integration for coastal system assessment) it reviews limits and benefits of the approach to drive back coastal fisheries and aquaculture on a sustainable way.

Modelling of aquaculture economics under a system approach: insights from the French study sites of the SPICOSA project

ID paper: 528

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System approach is increasingly recommended as a logical framework for expert advising in support of integrated coastal zone management (ICZM). The “System Approach Framework” proposed by the SPICOSA project (Science and policy integration for coastal system assessment) aims at building integrated models, which seek to represent the ecological, economic and social dimensions of coastal system dynamics. These simulation-models explore different scenarios of operational policy issues, and it is therefore required that the issue selected and the scope of the model were defined collectively by participant group.This paper presents the environmental modelling issues developed in two French study sites, into which the shellfish farming sector are included as one of their components. The Pertuis charentais study site deals with the quantitative management of freshwater within the Charente river catchment and its coastal zone. The shellfish farming sector may be impacted by freshwater scarcity due to both climatic conditions and upstream uses. The economic model is based on an average objective function for the whole basin and estimates the costs of adaptive strategies that farmers implement for achieving this production objective, depending on freshwater availability. The Thau lagoon study site deals with the management of microbiological pollution. The shellfish farming sector suffers from commercial bans due to contamination events. The economic model provides a cost-effectiveness analysis of contamination mitigation technical measures. In both models, the economic representation of the shellfish farming sector provides estimates and indicators which are meaningful in the context of the wider concerns raised by ICZM.

Economics and marine conservation

Marine conservation (Short title)

Effects of MPA on small scale coral reef fisheries and communities: evidence from Vanuatu (South Pacific)

ID paper: 228

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If the role of MPAs as a conservation tool is now widely demonstrated even with some variability, their effects on fishery yields, tourism revenues and social aspects are only confirmed by very few studies. More than 550 MPA now exist in the South Pacific mostly community based managed- and the expectations on their ecological and socio-economic effects are high. A study based on a control-impact approach has been conducted in Vanuatu (South Pacific) to evaluate the effects of MPA for the local and global community. 3 sites with well established MPAs and their respective control sites have been selected with a similar ecological habitat but with different fishing pressure, tourism development and level of subsistence economy. The most direct effects of MPA on the coral reef fisheries cpue and yields and on the site attractiveness for the tourism industry have been assessed. Other impacts on the social capital bridging and bonding- and governance of local communities were identified too. At a different scale, the benefits in the form of avoided cost for government as well as the attributes of world heritage conservation were considered. Most of these effects were quantified from observed data and as far as possible valued with a bio-economic approach with a special focus on the fishery assessment. The results showed variability in the outcomes between the sites. Some of them present small quantifiable benefits on fishery or tourism and reveal an imbalance between local and global beneficiaries, questioning the future of the MPA. The limits of the western economic approach in the Melanesian cultural context were outlined.

The valuation of marine ecosystems in West Africa: a tool for decision-making in ecosystems management and MPA governance

ID paper: 463

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In his report the economics of ecosystems and biodiversity , P. Sukhdev compared the valuation of ecosystem services and biodiversity to a compass which helps decision makers to engage in the conservation of environment and against the loss of biodiversity. Following this road, the authors present the results of an economic valuation of marine ecosystems for a sampling of MPA in four West African countries (Senegal, Cape Verde, Guinea, and Guinea-Bissau). These provide arguments on the importance of the valuation of Total Economic Value in promoting the conservation of marine ecosystems and stopping the loss of biodiversity. This paper shows how the valuation of marine ecosystems can help reconnect science and policy and provide a lever for action toward the conservation of marine ecosystems. In particular, the papers shows how non-use values (which compute both non-merchant services from the ecosystems and the perception and attachment of populations to the marine ecosystems) can provide key testimonies on the need to promote the establishment and strengthening of MPA and provide further instruments to govern under uncertainty and help adapting to change.

The non biological productions of MPAS as a major driver marine resources conservation s governance

ID paper: 488

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Based on empirical studies carried out in Reunion Island, Moheli (Comoros) and Madagascar, this communication deals with the non biological productions of MPAS as a major driver of the marine resources conservation s governance. Three types of productions can be drawn for each type of stakeholders: territorial, behavioural and economic. Firtly, the MPA zoning produces new territories, which are generally designed according to ecological parameters (habitat status,..). They overlap with a) the territories of the previous uses of seascape and b) the cultural grounds related to the territorial identity of coastal communities. For the previous users, this overlapping produces both an economical and a terrestrial cost. When the MPA zoning legitimates new uses of the seascape, it produces new territories and sometimes territorial identity. Secondly, MPAs produce lots of talks: direct (from the managers) and indirect (from the coastal populations). These talks lead to hope and satisfaction among the MPA winners or angry and dissatisfaction among the loosers. It is expected that a) after several years hope becomes satisfaction and angry becomes neutrality or satisfaction towards the MPA whose effectiveness has been proved, b) this process is sustainable. In fact this process is very vulnerable to the efficiency of MPA governance, in terms of financial security and ecological results. Satisfaction can move to dissatisfaction and then angry. When previous winners become or feel becoming loosers, they loose their trust into the MPA managers. Reversing this last process needs lots of energy and money. Thirdly, economical productions are both positive and negative. Positive aspects concern the direct wages of rangers, the fishing incomes due to the spill over effect, the income generating activities implemented to improve the social acceptability of MPAs. Negative aspects concern the lack of equity in the income distribution generating envy and finally lack of social acceptability of MPAs. These non biological productions of MPAs work as sociosystem services towards both the ecosystem and the coastal sociosystem and also cost towards the coastal populations. The social acceptability of MPAs for the stakeholders change according to the difference between services provided and costs generated by the MPA.

Conservation policies and changes in the economic status of activities and marine resources: the case of marine protected areas in French Polynesia

ID paper: 490

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Reefs and lagoons ecosystems of French Polynesia have been since a very long time the support of important traditional activities. They are today concerned by conservation public policies, which have considerable consequences about the relations between local societies and their environment. The necessity to stop the degradation of marine biodiversity and habitat has encouraged to implement environmental policies, and particularly the implementation of Marine Protected Areas. In French Polynesia, the Marine Space Management Plans, as that established in 2006 in Moorea, are quite recent experiences but their analysis allows identifying their main impacts. We shall show how the local system of activities has been affected by these policies. In particular the balance between extractives uses (fishing, shellfish gathering) and recreational activities seems to be challenged by the new regulations introduced by conservation policies. The new lagoon space zoning and the changes in access rights to lagoon space and biological resources have induced deep changes of their economic status. These changes will be analyzed by the mean of the public goods theory using exclusion and rivalry criterions. This economic approach will be completed by anthropological and institutional analysis in order to take in account the specificity of local rights and practices. We shall show how a policy oriented toward the preservation of marine biodiversity may induce drastic changes in access and use rights for different users categories but also in the overall economic system depending from lagoon and reef resources. These changes will in turn impact the local representation and adhesion to MPA s.

Regular session

Markets and marketing of seafood products

An economic analysis of low value species as an alternative nutritional source in strengthening food security in India

ID paper: 48

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According to nutrition based indicators, 50% of India s poulation is estimated to be below poverty line with inadequate nutritional intake. Though majority of Indian population derives its nutritional requirement from plant sources, there is a need to include animal proteins according to nutritionists. In India, animal protein costs much more than plant based nutrients. Income elasticity of demand is very high for high value food products like meat, milk and quality protein items. Hence, to enhance access to nutritional security, low cost avenues like fishery need to be explored. Fish provides high quality protein and a rich source of vitamins. Low value fish like myctophids can be exploited to augment nutritional access as conventional fish stocks are almost fully exploited. Most of these fishes are small, measuring 2-15 cm in length and living at depths between 655-3,280 ft (200-1,000 m). GLOBEC study (1993) has estimated a stock of 100 mn tons of Benthosema pterotum, the largest myctophid fish in the Arabian Sea. At present though they are not used for direct consumption owing to their high lipid or wax ester content, they can be used for making value added products or diet supplements. An analysis of cost of different sources of animal proteins revealed that it costs only Rs 115 to supply 1 kg of protein from myctophids as against Rs 714/kg for mutton and Rs 275/Kg of chicken protein. Hence exploitation of myctophids should be considered inorder to provide quality proteins to under nurished and poor people. Thus the future for myctophid as a potential resource is open if judiciously exploited and utilized as a source of low cost protein supplement. However this endevour calls for assessment of potential stock and consumers preferences and acceptance of myctophid species. A study carried out in coastal Karnataka through conjoint analysis to assess consumers preferences and tastes towards myctophids revealed that consumers with low income preferred myctophid mainly on account of affordability while higher income consumers gave improtance to its low cholesterol level of oil contents.

Markets and marketing of seafood products/MA01
Consumer's behavior

Behaviour, motivations and needs of consumers of fresh seafood products : new opportunities and marketing strategies

ID paper: 239

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Since 2004, the French fishery field has had to cope with a levelling off of consumption of fresh seafood products whereas the consumption of processed seafood products is increasing. Nowadays, consumers prefer easier products: fresh deli products, easy to cook or ready to consume. Therefore, fresh seafood products do not seem to fulfil current consumer demand intrinsically (aspect, taste) and extrinsically (cooking methods, use, origin, brand and price). In order to understand the evolution of behaviour, motivation and consumers needs, several behavioural studies have been conducted within the COGEPECHE research programme. In our article we focus on three of them: focus group, trade off and cognitive map. This study has been carried out using an innovative methodology. First, focus groups were organized to evaluate cognitive, emotional and prospective behaviours. Then, the drivers and discriminate criteria of purchasing behaviour were analysed by the trade off method. A cognitive map was created in order to understand consumer expectations when purchasing seafood. Such association allowed us to highlight consumers purchasing criteria (price, freshness). However, dissonances have been shown between consumers declarations and their behaviour. As a whole, these methods have pointed out the lack of consumers knowledge about seafood products. Five general motives for seafood choices have been noted: safety, pleasure, health, convenience and ethics. Key-words: Fresh seafood product, behaviour, motivations, needs, focus group, trade off, cognitive map.

Consumers knowledge and preferences about fish farmed species

ID paper: 261

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Based on the evoked set and analysis, a group of factors driving knowledge and preferences about fish farmed species are investigated with three different samples. Samples were collected in Spain, into a nationwide study about knowledge and assessments about aquaculture, funded by the General Secretary of Marine Fisheries of the Spanish Ministry of Agriculture, Fisheries and Food. An average 2,500 different consumers were interviewed each year in the period from 2005 and 2007. Respondents had to answer to two open questions indicating fish species that are being cultured and which of them they consume. The evoked set was formed with the most repeated species reported by consumers. The factors are classified into demographic and purchase habits. Their influence on the occurrences into an evoked set of cultured species identified and consumed by respondents is tested using binary logistic regression models. Five equations, corresponding to each species in the evoked set, are fitted with every sample for both known and consumed species. Results indicate that the occurrence on one species into the evoked set is related with income and education level, the format of the store, and other farmed species they know or consume.

Study of public perception in france about a potential fortuitous import of genetically modified fish

ID paper: 460

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DOGMATIS is a multidisciplinary research project funded by the French Research Agency (ANR, programme ANR-OGM 2007-2010). The transgenic technologies have been applied to fish since more than 20 years now and some strains are at the premarket or market stage in countries outside Europe. In Europe the main risk is a fortuitous import. Any rumour of uncontrolled arrival of GM fish on the European market may have strong impacts on the market chain, the research and innovation system and the trust in public regulation. The aim of DOGMATIS is to anticipate the answers. This programme is presented in another communication in IIFET 2010. As for socio-economic aspects, we studied the risk of fortuitous imports, as mentioned in the other communication, and we studied the perception of the public through two methodologies : (i) consumers focus groups organised twice (2007 and 2010); (ii) some comprehensive interviews with economic actors (wholesalers, retailers, supermarkets, fish farmers) and NGO. We propose to present the main points of our results about public perception, showing a complex set of perceptions linked with a multi-faceted image of transgenetic animals, as a potential technical innovation and/or a potential source of questions and debates by numerous ways.

Spatial equilibrium, market integration and price exogeneity in dry fish marketing in nigeria: a vector auto-regressive (var) approach

ID paper: 25

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Fish is the cheapest animal protein source in Nigeria and dry fish, in particular, has the potential to solve the pervasive protein shortage problem owing to its relative affordability compared with fresh fish. Boosting dry fish consumption will entail retail price reduction which is achievable only if the market for dry fish operates efficiently. This study, after testing and correcting price series for non-stationarity, modelled marketing efficiency in 66 pairs of spatially separated markets. The unit root test was used to reveal the order of econometric integration of the price series. All price series showed non-stationarity at their levels (P

Markets and marketing of seafood products/MA02
Prices determination

Supply and demand analysis for mussels in the EU market

ID paper: 110

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This study analyzes supply and demand system for the mussels in the EU markets. The results show that farmed and wild quantity of two main species of mussels, Mytilus edulis and Mytilus galloprovincialis, have declined in recent years due to limits of seed and space. However, a demand system analysis proves that the decrease will raise price of the products in the EU market. Inverse Almost Ideal Demand System (IAIDS) is applied for farmed and wild mussels show the two products are inelastic and less competitive. Own quantity flexibilities of farmed and wild mussels are -0.98 and -0.83, while scale flexibilities are -1.1 and -0.86, respectively. Wild mussels have low quality and are usually sold in frozen forms, while farmed mussels has higher quality and are supplied mainly in fresh forms. The quality difference explains why cross-quantity flexibilities of farmed and wild products are marginal at -0.13 and -0.023, respectively. The demand system with month-dummy variables satisfies all restrictions of adding-up, homogeneity, symmetry, and explains for 89% the variance (R2). Method of maximum likelihood estimation also shows that non-linear form is more appropriate for time series data in the study than a linear equation. Keyword: mussels, supply, inverse demand system, IAIDS, EU.

Inverse demand analysis of the tuna sashimi market in japan: an application of scaling in the rotterdam inverse demand system

ID paper: 441

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The tuna market is really many markets, differentiated by product - sashimi (frozen and fresh) and canned - and by locale - Japan, US, EU, etc. Supply varies across these markets, but overall there are decreasing stocks requiring severe intentional reductions in catch to rebuild stocks for the long run. The value-added tuna sashimi demand in Japan constitutes the largest fresh, chilled and frozen tuna sushimi market in the world. The annual total consumption of fresh and frozen bigeye, yellowfin, bluefin and southern bluefin reached the record high as 580 thousand MT in 1993 and shrunk to 349 thousand MT in 2008. Because of the scarcity of fresh bluefin tuna in Japan, substituting with different tuna species and fresh and frozen tuna became common (Yamamoto, 1994; Owen and Troedson, 1994; Bose and McIlgorm, 1996). Chiang, Lee, and Brown (2001) examine the impacts of inventories on tuna auction prices in Japan using the Rotterdam inverse demand system and claims that frozen tunas are more likely to be close substitutes. Since the demand conditions are varying quite well during 2000 -- e.g. declining demand in Japan for sashimi, declining demand in the US for canned, but increasing demand in EU for all tuna products, and cost increases are changing the composition of the fishing fleets -- from high cost nations to lower cost nations, which makes managing the overcapacity more difficult. While the domestic sashimi grade tuna harvests in Japan follow a decreasing trend since 1985, the total imports started increasing from 1985 to 2002. Imports of frozen tuna were about four times the imports of fresh tuna. Specifically, tuna imports in Japan had already begun exceeding domestic supply in 1996. As a result, 63.3% of the tuna sashimi consumption in Japan relied on imports in 2002; 1.7 times the level of Japanese domestic landings in 2002. However, since then, in 2008, tuna imports in Japan have experienced a 40% reduction, allowing domestic landings to account for 49.5% of the tuna used in sashimi market (Import Statistics in Japan, 2008). Following Chiang, Lee, and Brown (2001), this study tries to estimate the inverse demand models of the yellowfin, bigeye, and bluefin tuna for the sashimi markets in Japan using the Barten and Bettendorf's Rotterdam Inverse Demand System. The estimated price flexibility can be used to examine the importance of global quota management control inventory variables, for the impacts of financial crisis on tuna prices, for the impact of changes in fishing capacity upon total revenues, and for the impacts that climate change and policies have on markets.

Modelling market structure of the spanish salt fish market

ID paper: 144

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A significant pattern in Spanish salt fish demand over the last decade has been a steady increase in consumption of frozen light salted fillet, mainly at the expense of traditional wet salted whole consumption. Our findings suggest that a significant trend exists that consumers in Spain prefer purchasing the light salted fillet to traditional whole salted. The cross price effect of frozen light salted fillet in our Norwegian salted whole equation is significantly positive and is large in value. This suggests that the light salted fillet is a strong substitute for Norwegian salted whole. Strong substitution effects also exist between the salted whole from Norway, Iceland and Faroe Island. Overall the results indicate a strong challenge of Norwegian salted fish industry in maintaining its position is the Spanish market. The model were estimated using the Almost Ideal Demand System (AIDS).

Markets and marketing of seafood products/MA03
Prices determination

Eco-labeled seafood in japanese market: how does information affect consumers perceptions of eco-labeled seafood?

ID paper: 178

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Seafood ecolabel, such as Marine Stewardship Council (MSC) label continues to expand worldwide, particularly in Europe, the US, and Oceania. Consumers response to ecolabeled seafood products in the European and US markets has been studied in the past, mostly with encouraging results. Meanwhile, and after a decade since the establishment of MSC, seafood ecolabel has not penetrated the Japanese market, where per capita seafood consumption is by far the largest in the world. Focus group sessions suggested that typical Japanese consumers are simply not fully aware of the state of world fish stocks. This raised several interrelated questions: will Japanese consumers demand sustainably fished products, as indicated by the label, after being informed of the situation? Will there be a price premium for ecolabeled products? Will the content and the source of information matter? To answer these questions, we devised and implemented a web-based survey and discrete choice experiment on the national sample of 3,370 primary shoppers. Our study found that consumers perception of information reliability differed across the content. We also found that consumers trust on label differ depending on who is the certifier. Lastly, provided that (a) the consumers are made aware of the fisheries conditions and its relations to the ecolabel and (b) the label can be trusted, our choice experiment result suggests that there is a significant demand for ecolabeled seafood in Japan. We also analyzed how other important attributes (e.g., wild or famed, domestic or import) interact with the effect of ecolabel.

Hedonic prices for mussels in European market

ID paper: 457

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This study uses hedonic price approach to investigate how price of mussel is formed. The model uses 8896 observations (transactions) from auction market in Yeserke, the Netherland. The results show that product attributes such as meat content, size of the mussel, time and location of harvest are important information determining the market price. If farmers increase 1% meat content (percentage of meat per weigh of mussels) they can get a premium of 1.8% by price increase. Similarity, if size of mussel (the number of mussels per kg) increases 1% the farmers would benefit a price increase by 1.5%. However, only two size groups such as big size (22-23mm) and small size (20-19mm), which assumed being met consumer preference, have positive impact on the price. In addition, the result shows that other factors such as volume of transaction and clean level of mussels have significant influence on the price. The papers also have an overview on mussel production and consumption within Europe and give relevant suggestions for producers and marketers.

The role of trust in the exchange relationship: The case of the Kribi fish market in Cameroon

ID paper: 86

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Fish market organisation and supply in Cameroon constitutes a daunting challenge for the sector. In fact, it involves the reduction of logistic costs and those of the coordination between supply and demand, as well as the access of newcomers into more profitable markets. As such, the competitive structure of markets, the uncertainty of supply associated notably with the seasonality of fisheries, the perishable nature of products, and the strategic or opportunistic behaviour of actors, are among the factors influencing supply stiffness. This study sets out to understand the hybrid coordination between hierarchy and market in Williamson parlance within fresh fish market at Kribi, Cameroon. Its main objective is to highlight, aside from contractual engagements, the important role that trust plays in reducing transaction costs and facilitating exchanges. Combining the theory of transaction costs and that of social embeddedness of markets, will indeed enhance our understanding of social dimensions of exchanges as well as their dynamic factors. Contractual arrangements involve price negotiation, delivery agreements, and credit facilities to fishers. Supply channels founded on social ties contribute to rely on, and to build trust between commercial partners.Trust lies not only on the reputation gained through repeated transactions, but equally on family and social relationships. Preferential ties make up the low flow of information; they also mitigate the risk and uncertainty associated with the high supply and demand seasonality. Yet trust does not suffice in this context, while decreasing transaction risk requires complementary inputs from public devices to the existing private mechanisms.

Markets and marketing of seafood products/MA04
Markets and labels

Ecolabelling in fisheries along west african coast: the potential and pitfalls

ID paper: 139

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Eco-labelling is considered with increased interest within the scope of fisheries crisis, as a way to tackle both marine biodiversity conservation and development issues. Along West African Coast, diversity and specificity of seafood issued from localised fishery systems (or fishery territories) are remarkable and recognised from long time. Recently, initiatives to draw more value from fish and fishery while maintaining them for the future are more and more developing. Nevertheless, those innovative dynamics are generally initiated and implemented by foreign operators, targeting specific categories of customers and are unequally re-appropriated by the fishermen communities. They still occupy a minor place in local and national economies. Moreover, these devices are binding and thus exclusive. So, they could have unexpected and contradictory effects on biological and cultural diverstity. An Interdisciplinary (anthropology, geography, economic, sociology, ethnobiology, ecology and law studies) and comparative approach, conducted in different environmental, political and socio-economical contexts, leads to assess the constraints and opportunities attached to eco-labelling in fisheries (Biodivalloc programme, ANR05BDIV02). Also, the aim of this contribution is to examine the connection and consistency between the devices and norms that shape those instruments and the local practices and actors strategies all along the fish network. It seeks to determine the conditions of using these tools in ways that ensure the co-viability of coastal (biological and social) systems. This question is adressed through diverse study cases, the Mugil fishery of Mauritania, the Octopus fishery of Senegal, the molluscs exploitation (Arca, Crassostrea, Cymbium, Pugilina, etc.) of the Saloum Delta, Senegal.

The effect on product differentiation by origin labeling of seafood

ID paper: 142

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Problems with the security of imported foods and with false indications of origin have recently been uncovered in Japan, leading to increased consumer interest in the country or place of origin of foods. Furthermore, Japanese regulations on place of origin (under the Japanese Agricultural Standard Law) started in September 1996 and have been strengthened. They include measures similar to the EU s Geographical Indication (GI) and the USA s Country of Origin Labeling (COOL). Therefore, a country or place of origin is an important element when a consumer chooses and buys a marine product. This awareness has led Japanese consumers to choose Japanese products over imported ones. Consequently, Japan the world s largest marine products importer has been decreasing the quantity of marine products it imports since approximately 2000. At the same time, the market share of domestic marine products has been increasing, despite the fact that Japan s fisheries and aquaculture production has remained stable since approximately 2000. This study uses a few case studies to explain the above situations. It focuses on not only the competitiveness of Japan s marine products but also the competitiveness of local marine products and local brands, because the competitiveness of the former is affected by the latter. For example, in the wholesale market of northeastern Japan, local sea urchins have been replacing imported ones or caught ones in other district in Japan since approximately 2000. At the same time, the quantity of sea urchins imported into Japan has decreased.

Markets and marketing of seafood products/MA04
Markets and labels

Market segmentation in relation to supply structural changes: the case of the seabass market in France

ID paper: 342

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Wild seabass consumption in France is supplied by both small-scale fishing fleets (liners) and larger fishing fleets (trawlers and purse-seiners). This product differentiation supports a rather robust market segmentation which benefits to the liner captures, the average price of which is 50% higher. This price premium is explained at first by the quality of the seabass landed by liners, which may moreover be mentioned by a label created by producer organisations. In addition, the fishing fleets operate at different time periods, the seabass being more accessible for industrial gears during the winter, when small-scale fishing fleets are less active. Nevertheless, it has been observed that new fishing strategies are likely to blur the current product differentiation. For instance, the purse-seiners tend to improve the quality of their products, which become able to compete with the seabass from liners. This paper analyses the price formation mechanisms of wild seabass on the French auction markets. A crossed database has been built which enables the identification of marketed products according to their production technique. The first part of the paper depicts the seabass supply chain, from production (including aquaculture) to consumption. The second part analyses the determinants of product pricing and the spatial integration of first-hand sale markets for similar products. The third part estimates the impacts of changes in supply structure on product pricing and market segmentation. The results highlight some relationships between reallocation of access-rights and the valorisation of fish products.

Revealing potential demand for eco-labeled seafood in japanese seafood market

ID paper: 270

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In the market development of sustainable seafood, such as MSC-certified products, the Japanese market is one of the most important markets if measured by size: it is the largest seafood importer and the second largest consumer in the world, after China. However, little research has been done on Japanese consumer preferences for ecolabeled seafood. This study investigated potential consumer preferences for MSC products using experimental auctions, a method to create a realistic but controlled purchasing environment, to measure the willingness to pay (WTP) for eco-labels. In our experiment we also added several patterns of information treatments. This was motivated by findings from a previous study showing that Japanese consumers are less aware of the state of world fisheries, and consequently the relevance of eco-labels such as the MSC label. We investigated if and how the provision of information might alter the consumers preferences by providing participants with: 1. no information, 2. information on the MSC program, 3. information on the state of world fisheries, and 4. the combined information. Our analysis found significant differences in bids between labeled and non-labeled products dependent upon information provided. WTP for eco-labeled products given MSC information were not so different from the no information case, but were significantly different when given fishery information and both . Therefore, consumers have a potential to demand MSC products on the condition that they are aware of the necessity for fishery certification together with the meaning of the MSC label.

Markets and marketing of seafood products/MA05
Markets and labels

What willingness to pay on the French market for an ecolabelled shrimp?

ID paper: 340

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Shrimp is the most important commodity in the world seafood market (in value). Nevertheless shrimp fishing is also one of the most destructive. Its farming is also considered as having negative impacts on the environment. Ecolabelling is a tool used for more environmental responsibility of the industry. It is based on a win-win strategy for the farmer/fisherman, the consumers and the environment. The objective of this work is (i) to analyse the perception by consumers of the environmental problems associated with some productions in fisheries and aquaculture, including shrimps and (ii) to identify a possible premium for ecolabelled shrimps. A survey (302 people interviewed) showed that there is a market for ecolabelled shrimps in and around the city of Brest (France). Most of the people interviewed said they are concerned by environmental issues and that they know about the concept of ecolabels. They also declare that they buy ecolabelled products to act in favour of the environment protection . A payment card approach has been used to estimate the willingness to pay of the consumers to buy ecolabelled shrimps. A simple LOGIT model has been applied to identify what variables explain the consumer s willingness to pay. This work showed that seafood ecolabelling debate is not without interest in a country with a high level of seafood consumption like France and that further development of the research in that area can contribute to raise awareness among consumers and within the industry.

Seafood labelling and consumers choices

ID paper: 414

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In recent years, there has been a growing interest of promoting and rewarding the sustainable management in fisheries and aquaculture using product differentiation through eco-labelling and organic labeling respectively. At the same time food safety concerns arise due to the often food crisis experienced worldwide in the past few years. In this paper, we present a choice experiment addressing preferences for seafood products in Greece. Amongst other attributes, four different species (namely anchovy, cod, seabream and mussels) are included while two types of labels i.e. eco-label and organic label and a safety certification are introduced. As expected, new labels for fisheries products have a positive impact in the market. Consumers are positive towards the prospect of labelling for fisheries products, as compared to unlabelled products.

Fish sustainability information schemes: a global comparative assessment and their implications.

ID paper: 480

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This paper presents the findings of an 18 months global review of organisations providing sustainable fisheries information to consumers and other channel intermediaries completed in December 2009. The project was managed by a consortium of nine organisations involved with seafood, the Fish Sustainability Information Group (FSIG), from around the world incorporating FAO. The review examined the key organisations that analyse, assess and provide data, guidance, disseminate and otherwise communicate on the sustainability of world fisheries and aquaculture to retailers, foodservice sectors, consumers and others. The methodology engaged through interviews the 17 leading organisations considered to be representative of those involved in seafood sustainability communications, in addition to web-site data gathered from a broader sample. Evaluation of the various respective communications was made regarding accuracy, scientific robustness and relevance. The data analysis presents a hitherto unique scope of comparison of the governance procedures and output of the world s most significant organisations supplying seafood sustainability information. The paper then considers the implications of this analysis noting the respective merits and demerits of the two key categories identified: certifications schemes and recommendation lists. Particular emphasis is placed upon how such instruments might improve in future with respect to seven critical criteria identified. The findings are then contextualised within current and emergent policy measures in both capture fisheries and aquaculture. The paper concludes with some prospective consideration of how such communications might become more efficient and effective in an era of increasingly complex measures received by audiences subjected to evermore complicated market signals. Key words: Markets, Sustainability information, Certification, Recommendation lists.

Globalization and sustainability in tuna commodity chains

ID paper: 158

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Commodity chains for canned tuna are global, with fishing grounds in all the oceans, processing centers on every continent and end markets equally widespread. A tuna caught by a Taiwanese vessel in the exclusive economic zone of Kiribati in the Pacific may be transported to a cannery in Thailand by a carrier registered in Panama, the logistics of supply from the cannery to buyers in the European Union may be managed by a company based in Singapore, and then the tuna may finally end up in a sandwich in the UK. How does this globalization in canned tuna commodity chains affect the sustainability of tuna fisheries? The global nature of canned tuna commodity chains presents challenges to managing tuna stocks, in that regulatory responsibilities are spread over multiple jurisdictions, and it is difficult to trace tuna back along these chains to ensure it was caught sustainably. On the other hand, connecting markets that are concerned with Corporate Social Responsibility (CSR) to producers in developing countries without the governance frameworks to impose strict conservation measures is an example where globalization improves the sustainability of tuna fisheries.

Markets and marketing of seafood products/MA06
Supply and value chains

Fish marketing and food security in nigeria

ID paper: 172

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Fish is an important source of protein for the middle-class and elites across Nigeria. The handling, processing, and marketing of fish products are essential complementary functions of all food production systems. Additionally, the fish trade offers substantial employment opportunities in many coastal and inland areas where fish is caught. The importance of fishery products and its marketing had always been an important discourse among scholars due to its contributions to Gross National Product and the per capital income of fishermen in Nations with fishing capabilities. In Nigeria, however, given increasing demand for fish, there seems to be a potentially strong market for the product. And markets determine marketing policies. So, markets have to be considered before policy making can start. This study proffer solutions to some key questions in the study of marketing of fish products in Nigeria such as: Key questions on: commodity chains/networks, trader roles, control of market space, market information, credit provision, transportation questions, consumption pattern, food safety regulation, Key questions around legislation, standardization of weights and measures, trader associations, Pricing, the role of traditional authorities, and alternatives to traditional intermediaries/ forms of supply. This paper therefore focuses on fish marketing and food security in Nigeria. Its various stages of development were considered. The study also shows some major findings that will assist policy makers. It also revealed the key roles of storage and processing as main factors aimed at improving fish marketing in Nigeria.

Market dynamics and governance in global aquaculture value chains: chaining producers?

ID paper: 223

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The expansion of the aquaculture sector over the last two decades has coincided with the growth in importance of supermarkets in fish retailing in the EU. This paper presents a Value Chain analysis of selected species from their point of production in Thailand and Bangladesh to the major consumer markets in Europe, and in particular through retail supply chains. The paper outlines the Global Value Chains for the selected aquatic products from the chosen countries, then provides a critical assessment of the market dynamics in the major consumer markets and the governance structures in place. The paper establishes the conditions of participation in Global Value Chains, the barriers, and provides an initial analysis on possibilities for upgrading. It then concludes by examining the scope for further realisation of the values that might be added to aquaculture exports from such developing countries in an era of heightened green concerns, and potential effects.

Markets and marketing of seafood products/MA06
Supply and value chains

Testing for market power and functioning of the spanish seafood supply chain

ID paper: 371

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Traditionally, little attention was paid to the market and how the different levels of the market chain interact. However, recent price developments and the increase in the retail chains market share have raised awareness on the food supply chain and possible market power situations in Europe. This paper uses 2004-2009 weekly data to analyse the price transmission elasticity of the main 12 seafood products in the main 3 stages (Ex-vessel, Wholesale and Retail) of the Spanish market chain. We then investigate the price transmission asymmetries in these market stages and the presence of market power in the Spanish seafood market. Spain is one of the largest seafood markets in Europe and the world; for instance, around 39 kg per capita were consumed in 2007. The results obtained have significant implications for analysing demand, market power and margins in the seafood supply chain.

Role of mobile telecommunication in efficient marketing system and economic develoment: a study on fishing commuity in bangladesh

ID paper: 169

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Fishery is one of the sub-sectors of agri-cultural sector which plays a significant role in the economy of Bangladesh. However, fishermen are deprived from getting reasonable prices of their catches due to a large price spread between the price paid by the ultimate consumers or users and price received by the coastal fisherman. With the vision of building Digital Bangladesh of present government, the application of Information and Communication Technologies (ICTs) have become an extremely vital for reducing poverty, illiteracy and overall structural inefficiencies in Bangladesh. At the time of booming of information communication technology in the country, mobile communication is playing a fundamental role by coordinating supply and demand of the catches, providing free flow of price information to the fishermen in the remote areas. Under the above circumstances, the main objective of the research is to find out the role of mobile phone in fish marketing system that ultimately enhance the economic condition of which originates in coastal fishing communities of Bangladesh. This study includes exhaustive literature review; secondary data analysis, and interviews with 200 individuals having connection with fisheries from four coastal areas of Bangladesh. This article has provided evidence of the value of mobile phones in having an efficient marketing system and economic uplift in case of transaction cost reduction, increased income, increased income, risk reduction, increased bargaining power, and increased market efficiency.

The value chain of yellow fin tuna in sri lanka

ID paper: 319

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The fishing industry is particularly important for Sri Lankans for the domestic supply but there is also a small but growing export market for high value products. The potential for economic development lies there with yellow fin tuna as the most important specie. In this research the efficiency and productivity of the yellow-fin tuna value chain in Sri Lanka was studied. The main method emphasis was on interviews with value chain actors (primary data) but secondary data analysis was also used when available. The lack of reliable secondary data from Sri Lanka fisheries made the use of primary data necessary. Interviews were conducted from late 2007 until July 2008. The conclusion is that two different value chains are characteristic for the Sri Lankan Yellow fin tuna industry; the domestic market value chain and the export market value chain. The local market is highly regulated and price oriented with low emphasis on quality. The export market is characterized by demand for quality and high prices. It relies heavily on the landings of foreign vessels. Additional emphasis on the export market could increase revenues of the sector but for that structural changes are essential. The local vessels are generally too small and poorly equipped to meet the quality requirements of the export market. For the local fleet there are considerable opportunities for improving quality and reducing costs. Main obstacles are the lack of knowledge and unstructured flow of information between fishermen and processors/exporters, as well as the lack of trust between actors.

Markets and marketing of seafood products/MA07
Supply and value chains

A comparison of the icelandic cod value chain and the yellow fin tuna value chain in sri lanka

ID paper: 328

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Research of value chains in fish industries indicates that there is great difference in value creation of the domestic part of the value chain between countries with underdeveloped fish industries and developed fish industries. This comparison is founded on the authors´ research on the value chains of Icelandic cod and Yellow fin tuna in Sri Lanka. The research is done in cooperation between the University of Akureyri, the United Nations University - Fisheries Training Programme and the National Aquatic Resources Research and Development Agency (NARA) in Sri Lanka. The main emphasis was to uncover underlying causes for the possible differences in the value creation in the chains. The results show a great difference of the relative domestic value creation for the two countries, where the valued retention of the domestic part is relatively much greater for the Icelandic value chain. Similar result for comparable value chains has been shown in 2006 by Gudmundsson, Ashe and Nielsen in their paper on the Revenue distribution through the Seafood value chain. The research indicates that this difference can partly be traced to the different structure of the value chains, highlighting differences in relationships between actors and in trust. The difference in flow of information and knowledge is also an important factor in explaining the dissimilarity as well as different strategic positioning, investment opportunities and fishery policies.

The role of fish-markets in the Icelandic value chain of Cod

ID paper: 386

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The two main pillars of the Icelandic fishing industry are the large vertically integrated fishing companies and the SME s, specialised in fishing, producing or marketing. In order to understand how they are able to function side by side and at the same time secure a relatively high value added for the domestic part of the Icelandic value chain of cod, a closer look at the functions and operations of the Icelandic fish-markets is needed. In the authors recent studies on structural changes in the fisheries value chain in Iceland from 1990 to 2007, six dissimilar main operational strategies were identified. Common to all of those was the need for an efficient use of the Icelandic fish markets. Three distinctive forms of fish-markets use were identified; firstly, specialisation, where companies use fish-markets to sell off all other species usually to SME s producers specializing in those species, secondly, assurance, where companies ensure raw material and fill in when there is lack of Cod from the company´s own boats and, thirdly, market driven, where companies completely rely on fish-markets for the supply of Cod. To further study this facilitator of industrial success the focus is on the importance of fish-markets from the time of their establishment in Iceland in 1987. The research is based on semi-structured and in-depth interviews with managers of a number of Icelandic fishing companies and is a part of an ongoing research on the value chain structure and organisational- and productivity changes in the Icelandic fisheries sector.

Markets and marketing of seafood products/MA07
Supply and value chains

Value chain structure and performance in the salted cod markets

ID paper: 410

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Although many countries develop dominating export conventions aimed for strengthen the fishing industry export based economy, the export performance varies. The institutional reasons for such differences in performance are investigated in a comparative study of the Norwegian and Icelandic export of salted cod to the Spanish market. Iceland has over a 20 years period, received significant higher average prices compared to Norway in the Spanish market for salted cod. The paper explores the significance for price differences in the value chain adaptation to demand in Spanish salt fish market. The reasons for the price differences will firstly be searched for in the structural differences between the countries fish supply chain from harvest related to fish stock migration, resource harvest strategies, fleet structure, fish quota allocation and first hand sales organization and secondly in the processing and export industries market adaption when it comes to product mix and export strategies. Thirdly the interactions of these factors into marketing conventions maintained in the two countries value chains are explored. The reported study is empirical and inductive based on import/export data from Eurostat, Norway and Iceland, regulation data from the respective governments and expert interviews with Norwegian and Icelandic value chain actors.

A market chain analysis of northern gulf cod fisheries pre- and post collapse: implications for resource sustainability and economic viability

ID paper: 412

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This contribution uses a fish chain approach or ocean to plate analysis to examine key market drivers affecting Newfoundland s Northern Gulf cod fisheries since collapse in early 1990s, with implications for economic viability and sustainability. Secondary data was compiled and analyzed for the pre- and post-collapse periods, focusing on multiplespecie interactions, landings, value, prices and trade flows. Using semi-structured questionnaires, key stakeholders were interviewed on: (i) access and allocation of raw materials, (ii) spatial scale of operations, (iii) social and economic networks, (iv) harvesting and processing policies, (v) supply chain organization, and (vi) markets. Preliminary results indicate that the target species have shifted from high volume groundfishery to high value shellfisheries with global markets, with ecological implications for backward bending supply, conservation incentives, and recovery strategies. In the pre-collapse period, the cod fish chain was producer-driven characterized by high volume in the form of blocks for transformation into battered and breaded fish primarily for the U.S. market. The operational range since collapse is shorter and characterized by poorer access to raw material, lower quotas and production volumes. The current cod fish chain has reversed into a more consumer-driven chain that produces low volume, high-value cod fillets and cod by-products that cater to niche markets in the US and UK, and for local consumption. Based on this analysis, I argue that the future economic viability of the Northern Gulf fisheries depends on institutions for ecosystem-based approaches, policy instruments for effective stakeholder engagement, product diversification and eco-certification for market access.

Feasibility study of production oyster flavored smoke

ID paper: 423

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We analyze the financial technical feasibility of an assembly would have a productive activity in the Lagoon of Pueblo Viejo, Veracruz, Mexico, based on the exploitation of the American oyster (Crassostrea virginica) fishery resource, for project evaluation: Implications for the marketing of fishery and aquaculture products: oyster case "by the Instituto Nacional de Acuacultura y Pesca and the Instituto Tecnológico de Boca del Rio. We used a structured approach to the problem situation through a mental map, an analysis of Strengths, Weaknesses, Opportunities and Threats (SWOT) and a logical framework matrix. Considered feasible a monthly production of 480 kilograms of oyster-flavored smoke at presentation glass jar of 160 ml of product. For this production, the raw material would be obtained from the oyster fishery and artisanal mining of 30 boats from the town of Pueblo Viejo. The project showed sensitivity to market prices and raw material. The financial evaluation results indicate a benefit-cost ratio of 1.78 of successful investing, Internal Rate of Return (IRR) of 21.4%, a Net Present Value (NPV) of $ 92,573 pesos and a MARR of 18%. Since the price of the product in the market will be offered locally at a cost of $ 30.00 Mexican pesos in national currency. The present study is to perform a technical and financial proposal under a model of oyster product marketing and processing oyster flavored smoke with oyster cooperators of Pueblo Viejo, Veracruz, Mexico.

Markets and marketing of seafood products/MA09
Seafood processing and international trade

Changing trends in offshore processing: implications for the New Zealand seafood industry

ID paper: 472

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The past twenty years has seen the offshore outsourcing of post-harvest fish processing gain unprecedented momentum. The growth in offshore processing is a further stage in an increasingly globalised fisheries value chain. Raw material is head and gutted, then frozen, and transported to processing sites in Asia (especially China). The fish is then thawed, value-added processed, and refrozen for export to the original sourcing country or third country markets primarily Europe and North America. China is the world s largest exporter of seafood principally due to its cost-efficient re-processing trade. The growth in offshore processing has heightened concern in terms of traceability, food safety, country of origin labelling, and fraud. The performance of New Zealand s seafood processing industry is intrinsically linked to, and influenced by, market forces. New Zealand seafood companies first began to sub-contract processing to China in the early 1990s. A reduction in hoki quotas coupled with increasing processing costs as well as the disposal - and/or configuration changes - of trawlers contributed to moving value-added processing offshore. New Zealand companies have also transferred processing technology to China during the last fifteen years. In order to understand the drivers behind the move to offshore outsourcing, this paper critically examines the development of China s post-harvesting processing industry before exploring the changing nature of New Zealand seafood company s production practices. The paper ends with implications for the New Zealand seafood industry value chain.

SME growth and entrepreneurial capabilities: a Penrosian approach to the seafood processing industry

ID paper: 474

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In an era of outsourcing many seafood processing firms struggle to grow. Reasons advanced include a lack of entrepreneurial-management capabilities, compliance costs, competition, distance to markets, and poverty of ambition. Penrose in her classic 1959 book 'The Theory of the Growth of the Firm' argues while firms uses both internal and external resources in order to grow, the capacities of management limits growth. In the pursuit of profit, entrepreneurial-managers learn about other potential products and services that these resources can produce. This process improves efficiency and produces surplus management resources, which can then be used to take advantage of other 'productive opportunities'. Since this is a continuous process, there is a strong motivation for the firm to diversify, and thus this leads to growth. Importantly, entrepreneurship is the essential ingredient necessary for continuous growth. The relevance of Penrose's framework goes to the extent of its theoretical integration - it's cross-disciplinary, encompasses internal and external firm analysis, and moves between different levels of analysis. The seafood processing industry is particularly suited to Penrose's arguments. Anecdotally, processing firms with a strong 'technological base' enjoy a solid foundation to grow, through scale and diversification - also the direction of growth. Using a combined research design this research focuses on addressing: How do entrepreneurial-management capabilities influence value-added activities in small and medium sized (SME) seafood processing firms? This will shed new light on factors contributing to or hindering growth. Comparisons will also be made between value-added and non-value-added seafood processing firms within New Zealand and Australia.

Markets and marketing of seafood products/MA09
Seafood processing and international trade

The analysis on the tee of china export aquatic products and the export trend to japan

ID paper: 21

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Japan has been the biggest export market of aquatic products of China for many years. The export of aquatic products to Japan reached more than 700,000 ton and $ 3 billion in 2007. The influence to the export market caused by the sweeping economic crisis will affect the benefits of the export enterprises of China. The trade complementary index shows great potential of aquatic products trade between China and Japan. However, under the circumstances of economic crisis, to set up limits of import would be the prior choice of the trade policy by Japan. The paper analyses the trade economic efficiency (TEE) of the export aquatic products to Japan in detail. TEE is an index to reflect the export situation of one country from the economic point of view by the trend of trade price change. If TEE>1, then the trade (either export or import) of the interested country is more efficient than the average level of the world market.

The impact of exchange rates and risk on u.s. sablefish imports

ID paper: 197

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The effects of exchange rates and risk on sablefish imports of U.S. from Canada, China, Norway and Iceland are examined in the context of the Armington framework. The import demand function is derived from the framework by separating exchange rate from cost and accommodating exchange rate risk. The extended import demand functions are estimated with cointegration techniques, error correction models (ECM) and partial adjustment models (PAM). Significant long-run effects of the weighted exchange rate risk are supported by the data, but for short-run effects, consistent results cannot be attained. The significant estimates of the relative price and relative exchange rate confirm the hypothesis that bilateral trade flow is affected by the third-country s impacts.

Seafood import demand and its impact on caribbean fisheries production

ID paper: 19

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The present study employs a cointegration method and error correction model to analyze the long-run relationship and short-run adjustment of aggregated seafood import demand function for selected Caribbean countries. The study has three objectives: (1) to examine the effects of import prices, income, tourism, and trade policies on Caribbean seafood import demand; (2) to test the causal relationship between seafood domestic production and seafood import; and (3) to analyze the economic surplus of interventions to reduce import, and to promote domestic production. The results show that there exists a long-term equilibrium relationship between Caribbean seafood import and related factors. Import demand elasticity is 1.72. Exchange rate has negative an effect on seafood imports, a one percent increase in exchange rate causes 1.55 percent decrease in seafood imports. Income has positive effect on seafood imports; a one percent income increase causes seafood imports to increase 0.22 percent. Tourist arrivals have positive effects on seafood imports, a one percent increase in tourist revenue cause 1.17 percent increase in seafood imports. Seafood imports have a significant negative effect on domestic fisheries production. The study suggests an outward shift of world seafood supply in the Caribbean region. The shift causes import price to decrease, and domestic seafood production to decrease as well. Economic surplus of a tariff policy and a supply expansion policy have been simulated. Both policies reduce imports, and enhance domestic production and producers surplus. However, tariff policy reduces consumer surplus, while supply expansion increase consumer surplus.

Quantifying the impact of sanitary and phytosanitary (SPS) measures on Indian seafood industry: The Case of Kerala, South India

ID paper: 100

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This study represents an attempt to estimate the effects of SPS measures in terms of trade elasticity of regulations and competitiveness of exports. In spite of the generalized acknowledgment of growing liberalization of trade between countries, there are still numerous obstacles to trade, more of the non-tariff type. This study aims to contribute to the literature on quantifying the economic impact of health and environmental regulations expressed in the form of SPS measures on international trade in agro-food products, by taking Indian seafood exports case study. The gravity analysis, complemented with the CMS model, helped to obtain an insight into the overall dynamics of the export markets, trade flows and competitiveness of fish and fishery products (aggregate level), shrimp and cephalopods. For the regulatory variable, the maximum residue limit (MRL) on cadmium in the model is used as an independent variable. Thus, it was made much insightful in understanding the relationship between trade restrictiveness of regulatory stringency and export competitiveness of the commodities. A detailed study on micro level dynamics of Kerala seafood export sector has been carried out, particularly to understand what the industry level changes are experienced during the food safety regime The results indicate that regulations on cadmium appear to be moderately trade restrictive. At the same time results are divergent at the disaggregate level, which is significant from the point of view of policy. The most important aspect of the existing chain in Kerala s seafood sector is the gradual disappearance of the independent pre processing sector which has been an important stake holder of the seafood value chain of Kerala. The pre processing node of the value chain is getting integrated to the processing sector causing a major restructuring of the existing value chain.

Compliancy with EU food law and changes in the Philippines' shrimp aquaculture chain

ID paper: 280

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Following a ban to export seafood products to EU in 2004, the Philippines (started a very active process of compliancy with European Food Law, which (achievement was successful since the country has been found to be capable of ensuring the required level of food safety in 2006, after an inspection by the European Food and Veterinary Office. In 2007, the CIRAD, in partnership with the Bureau of Fisheries and Aquatic Resources (Philippines), the University of Stirling (UK) and the Centre de Sociologie des Organisations (CNRS-Science Po Paris) launched a research program in order to better understand the process and its implications for sustainable development.((Unlike other countries, innovation in Philippine aquaculture is (generally a bottom-up led process. However, during the process of compliance with EU food law, innovation has clearly been a top-down process that helped the country to catch up at all levels, from the government food safety enforcement units up to industry. The process can now be overviewed as having been beneficial to (the country, because the exclusion of small operators did not lead to any(income reduction in practice. ((In the case of the Philippines, the study showed that the main strength of the country has been to demonstrate its capacity to easily and efficiently shift from one development paradigm to another. Without this temporary change, the Philippines wouldn t have been in the condition to ensure the dramatic but sustainable changes in its aquaculture chain that it achieved.

Exploration of united states domestic economic impacts of the cites appendix i listing for bluefin tuna

ID paper: 285

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Bluefin tuna (BFT) stocks in both the Western and Eastern Atlantic are in danger of commercial extinction due to over harvest. Years of exceeding mortality quotas and lack of management action is to blame, as is illegal fishing in the Eastern Atlantic. The species qualifies for a Convention on International Trade in Endangered Species (CITES) Appendix I listing and such a listing will be voted on at the upcoming (March 2010) CITES meeting. A CITES Appendix I listing prohibits all trade in listed species and prohibits domestic industry from landing BFT outside of their territorial waters. The US has a fairly robust BFT industry that targets BFT with hand gear and purse seines and also incidentally catches BFT in other tuna and swordfish longline gear, but the industry has failed to catch its quotas for several years. Currently the US imports 23.9% more BFT than it produces. CITES would act as a protectionist trade measure in this instance, increasing domestic BFT prices due to this current trade deficit. Price elasticities are taken from the literature and applied to current prices to forecast a range of potential price increases. These price increases are then used to forecast the economic impacts of a CITES Appendix I listing. In the short term, until BFT begins to recover and availability in the Western Atlantic continues to be low, a CITES Appendix I listing would increase revenues and economic impacts for the domestic harvesters and primary dealers. On the other hand, a CITES Appendix I listing would reduce revenues for importers.

An analysis of impact of tariff reduction in the non-agriculture market access negotiations in the wto doha round on the fisheries sector in taiwan

ID paper: 440

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According to the 2005 World Trade Organization (WTO) Hong Kong Ministerial Declaration, NAMA negotiations will reduce tariff by using the non-single coefficient of Swiss formula. Based on the Swiss formula with coefficient 8 for developed members and the status of new members, the deadline for Taiwan to reduce tariff will be extended for two years. As Doha round negotiations will be implemented in January of 2011 with a 5-year implementation period, this suggests that the completion of final tariff reduction will be scheduled in December of 2017. This study utilizes mathematical programming techniques by applying the most current dataset in 2007 to the fisheries sector equilibrium model of Sun et al (1999) and at the same time considering both future population growth and economic growth rate of 2% to simulate the impact of tariff reduction on the fishing industry. We find that the import quantity of fishery sector in 2017 will increase by 36.96% of the 2017 predicted baseline. In addition to tariff reduction formula, we make further adjustments the supply elasticity of factors to conduct sensitivity analysis by simultaneously considering the impact of the low price of imported fish products as direct substitute for domestic products. The import quantity of fishery sector will increase by 91.51% in 2017, while the total production and the value of fisheries sector will decrease by 6.64% (which is about 96,967 MT) and 14.23% (which is about NT$22,723,647 million), respectively, of the predicted value of the corresponding baseline. Within the Taiwan s fishery sector, aquaculture will bear the heaviest burden of the loss in output. Because the production of all three major fishery sectors will fall, the total production and the employment of fishery sectors will be reduced by 6.64% (which is about 96,967 MT) and 21.19%, respectively. According to the fisheries statistical yearbook in 2007, 342,915 were employed in the all fishery sectors. This means that as many as 122,112 people will be unemployed. The aquaculture sector will suffer the biggest loss in employment of 23.27%. Among the forty-three fishery products, farmed shrimp, shellfish, and fishes will suffer most of the loss in output reduction. The production cost of giant shrimp, small abalones, eel, oyster, and other aquaculture products exceed their output value, and the low price imported fish products will replace them in the market. Competition from imports will make it difficult for the producers to survive. It is anticipated that 10% of the above-noted fish farmers will have to withdraw from the industry. They will need government to assistance to find alternative employment.

Modelling

Existing bioeconomic models review

ID paper: 192

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There is a growing interest in using bioeconomic models as a tool for policy analysis to better understand pathways of development and to assess the impact of alternative policies on the natural resource base and human welfare. One of the potential benefits of these models is that one can get a better and more comprehensive indication of the feedback effects between human activity and natural resources. Modern computer power permits development of complex models far beyond what was possible only a few years ago. It has therefore become possible to make models that are theoretically more consistent and empirically more accurate. According to that and under the scope of a contract with the Commission a full review of the EIAA, TEMAS, MOSES, BEMMFISH, BIRDMOD, MEFISTO, AHF, EMMFID, SRRMCF, COBAS, ECOCORP, ECONMULT and EFIMAS models, has been undertaken. In this work the lessons learned from this review are presented, in particular we describe and analyze how these model consider and differ among them in terms of the classification, their biological and economic modules, the integration between both modules, the indicators they provide and the use of them. We pay particular attention to the necessity of them as well as how a model is built concluding that, even if the number of models is huge, the construction differences respond to the necessity of giving answers to different questions.

Measuring the dynamic efficiency costs of common-pool resource exploitation

ID paper: 264

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This paper conducts the first empirical investigation of common-pool resource users' dynamic and strategic behavior at the micro level. We examine fishermen's strategies in a fully dynamic game that accounts for latent resource dynamics and other players' actions and recover the profit structure of the fishery. The ability to measure efficiency losses from common-pool resource exploitation hinges not only on data availability but also on recent methodological developments in dynamic discrete choice modelling. For estimating the choice model, we use a two-stage estimator. In the first stage, we estimate the evolution of the state variables, namely, factors influencing players' decisions. These factors are reflected in choice probabilities conditional on those state variables. In the second stage, since there are many agents, we use a simulation-based conditional choice probability estimator to evaluate a choice-specific value function for each individual. Then we apply the pseudo maximum likelihood (PML) estimator to solve for the structural parameters. We apply the model to microdata on the North Carolina shrimp fishery. To quantify the dynamic efficiency costs, we compare the fishermen's actual and socially optimal exploitation paths under a time-specific limited entry system. We find a sizable dynamic externality in which individual fishermen respond to other users by exerting effort above the optimal level. Congestion is costly in the short run but is beneficial in the long run because it offsets some of this dynamic externality.

Optimal management under asymmetric information: a principal-agent analysis

ID paper: 322

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In the economic literature on fisheries management complete information is normally assumed. In reality fishermen have more information than the regulatory authority. In the present paper a principal-agent approach is applied to analyse management with a tax on fishing days under asymmetric information about the skill of fishermen (productivity) and fishing effort apart from fishing days. Regulation with a tax on fishing days does that and reaches a second-best optimal situation.

Modelling/MO01
Modelling

Employing pattern-oriented modelling strategy in devloping agent-based model of socio-economic systems: the experience from hawaii s longline fishery

ID paper: 307

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Pattern-oriented modelling (POM) strategy has been successfully applied to build, calibrate and validate agent-based models (ABM) in ecology. Instead of the traditonal modelling strategy that often requires comparison of the magnitude of model outputs to a selected set of observed responses, POM focuses on the ability of the model to reproduce a set of identified important patterns observed in the real system. POM allows identification of pertinent behavioral rules at the individual agent level that are deemed important in generating a wide range of emergent system-level responses. It avoids the difficulties and formidable expenses of calibrating the model precisely. In addition, it allows testing of model structure at various sub-system levels against the relevant patterns observed. Furthermore, it avoids several pitfalls encountered in traditional statistical comparison of model and observed system responses. This paper presents the experience of using POM as an alternative strategy in an on-going project of developing an agent-based model for simulating the fishing decision and activities of individual vessels in Hawaii s longline fishery (HLF). To our best knowledge, POM has not yet been employed in modelling socioeconomic systems. Using the logbook data of HLF for the period 2004-2008, several pertinent patterns have been extracted to guide our model development effort. They are seasonal distribution of fishing effort, spatial distribution of fishing effort, length of fishing trip, seasonal and spatial distribution of high-liners fishing efforts, and entry and exist of vessels in HLF. The patterns recognized in this study provide a vivid picture of HLF at a deeper level. It is the first step of employing POM in developing the agent-based model. The patterns will be used to develop and validate the agent-based model of HLF. We believe that the methods and patterns documented in this paper are invaluable for advancing ABM and POM in studying socioeconomic systems such as fishery.

The 2012 revision of the common fisheries policy (cfp): consequences of ecosystem based management and increased ngo influence

ID paper: 335

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Focal in the 2012 revision of the Common Fisheries Policy (CFP) is ecosystem based management. Implying a more holistic approach one aspect of ecosystem based management is to include new stakeholders. When the new stakeholders get a say in the fisheries management this will affect the regulations of the original regulator, the authorities. Applying a common agency model we show that the introduction of a new stakeholder (principal) will make the authorities use of regulations weaker, as they react to the new stakeholder s regulation by moderating its own regulations, but the net incentive scheme (aggregate of regulations) will be stronger. The new stakeholder also moderates its regulations when it knows that they come in addition to those of the authorities. This is the case when the two principals share the same interests towards the agent. When the new stakeholder holds only environmental interests towards the fishery, it sets the regulations unilaterally, and in this case the net incentive scheme is stronger compared to when both principals hold environmental, economic and social interests. We use a common agency model which has previously been used to analyse how a government and an independent interest group can influence the central bank s choice of inflation rate (Chortares and Miller 2004, Campoy and Negrete 2008). These common agency models in turn rest on the work of Walsh (1995), showing that the optimal contract for a (single) government to offer a central bank when the government is concerned about inflation, is linear in the central banks decision variable, money growth. The private information in the previously mentioned models are introduced in the form of a stochastic term, and it can be shown that the optimal contract is independent of this term. Thus information revelation is not an issue. So far we have solved the model under symmetric information. Introducing asymmetric information by the use of a privately known stochastic term (probably) will not alter the results. However, more realistically, the private information, as held by fishers, will concern catchability or harvesting costs, which are exogenously given parameters. Single principal-agent models to analyse optimal regulations (incentive schemes) of a fishery has previously been applied by Jensen and Vestergaard (2002a, 2002b, 2007), but as far as we know fisheries regulations have not been analysed in a common agency context.

A bioeconomic view on size-related harvesting: Does size matter?

ID paper: 475

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The individual size of fish as a proxy for life-history traits and market value displays an important, yet in bioeconomic modelling often ignored biological and economic parameter. This raises the question if and to what extent the consideration of a pricing related to the individual size influences optimal harvest strategies. We demonstrate here that the magnitude of size-dependency in the pricing clearly causes a quantitative impact on the outcome of optimizing the harvest strategy. Resulting is not only a shift regarding the potentially achieved revenues, but mainly a correlation regarding the optimal fishing pattern and the catch weights. The observed qualitative tendency towards a reduction in the fishing mortality simultaneously yielding higher catch weights with increasing size-dependent price effects can be generalized and is insensitive of additional economic factors like the discount rate or demand functions. These findings suggest that size-dependent pricing has a certain impact on the harvest strategy if one is aiming for maximum economic yield (MEY) and hence it should be more often accounted for in bioeconomic modelling.

Generalization of age-structured models in theory and practice

ID paper: 327

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A generalization of the harvesting functions and the stock updating functions in age-structured bioeconomic models is outlined. Using this generalization everything from completely uniformly distributed fish to extreme schooling is taken care of. The classical Beverton-Holt model comes out as a special case of the generalized model. Both the theoretical outline as well as practical numerical examples are provided, and the generalization can be applied both for simulation as well as optimization purposes given appropriate software. Here we apply advanced non-linear programming to maximize the net present value in a bioeconomic setting where the new updating and harvesting functions are used as constraints. This is possible thanks to new software, such as KNITRO, for solving highly nonlinear problems. Applications of this generalized model produce interesting new results. One such practical result is that pulse fishing seems to become less and less economically profitable as we move from uniformly distributed fish to schooling species. The main reason why pulse fishing cease to be optimal in schooling fisheries, is that the economies of scale present in search fisheries gradually disappear when we move from search fisheries to schooling fisheries. This may have important implications for how fish stocks ought to be managed in the future, especially with respect to total allowable catches based on bioeconomic criteria.

Incorporating habitat dynamics into bioeconomic model of fishery. Application to artificial reefs

ID paper: 171

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In this paper the emphasis is put on an important aspect of renewable resource use that was disregarded until now. It is the evolution of environmental carrying capacity which is traditionally interpreted as a maximal population level that can be supported by the environment (or by habitats of which it consists). Hence we adapt the Gordon-Schaefer model with constant carrying capacity by incorporating time-dependent carrying capacity that determines the state of habitats. They are subject to some biological processes (habitat rehabilitation) as well as to human aggressions (in particular habitat degradation due to fishing). Based on the developed model, we reassess the recommendations considered as a benchmark for resource managers until recently. Under simple hypotheses on the form of habitat (carrying capacity) dynamics, the current study has shown the importance of the latter for the design of management tools. When dynamic patterns of habitats are not taken into account, fishery recommendations based on Gordon-Schaefer model can be aberrant and lead to the collapse of the fishery. The presented model allows not only to enrich the design of management tools but also to assess the performance of artificial reefs, a promising ecosystem-based tool widely used in some coastal areas. The economic benefits of artificial reefs are still not well studied and represent a challenge to take up. Since artificial reefs are conceived as replacement for natural habitats, they assume the same role as these latter. Therefore the structure of our model seems appropriate to evaluate this particular management tool.

A model of fishing through fish communities

ID paper: 291

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Recent work in the domain of fisheries ecology has shown that major changes occur in fish communities exploited by commercial fisheries. Selective fishing pressure on the more highly valued components of fish communities is amongst the key factors proposed to explain these changes. Under de facto open access conditions, it is suggested that sequential over harvesting of higher valued fish and/or fish species leads to modifications in the structure of both fish communities, and fisheries landings. This poses the question of the economic drivers of such sequential over-harvesting, and the implications of this process in terms of the total value of landings from a given fish community. The aim of this paper is to present an analysis of this question using a simple bio-economic model of an open access fishery targeting different species. The model is used to analyze the process by which harvesting of the set of species develops, given differences in the economic and biological characteristics of these species. Sensitivity to these differences of both development paths and steady state equilibrium of the fishery are analyzed. Simulation results show that, where total effort is controlled but its allocation between alternative species may occur freely (a case of regulated open access), there may be significant consequences in terms of the biological status of stocks, and of potential maximum rents.

Modelling/MO03
Modelling

Sustainable yields for ecosystems. a mathematical viability approach

ID paper: 99

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We define the notion of sustainable yields for ecosystem, with particular emphasis on long-run consistency between ecological and economic conflicting objectives. We provide ways to compute sustainable yields by means of a viability analysis of generic ecosystem models with harvesting. We apply our approach to a Lotka--Volterra model of the anchovy--hake couple in the Peruvian upwelling ecosystem. Our analysis suggests that, during the anchovy collapse, the fishery could theoretically have been viably managed to produce catches above the expected levels while ensuring biological conservation. Our computations of sustainable yields yield figures which are quite close to the last Peruvian official quotas of 2006 and 2007. Control and viability theory methods allow us to introduce ecosystem considerations, such as multispecies and multiobjectives. They contribute to integrate the long term dynamics, which is generally not considered in conventional fishery management.

Evaluation of management procedures: application to chilean jack mackerel fishery

ID paper: 94

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Chilean Jack Mackerel fishery is the largest chilean fishery in terms of catches (around 1.5 tons. per year during XX century) and in terms of economic impact (US$ 350-400 millions per year). This pelagic species is affected by divers factors which increase the uncertainty in the model representing its stock evolution, among these factors, the most important is generated by El Niño phenomenon. These uncertainties make the sustainability assessments more difficult. Indeed, in some extreme cases, recruitment uncertainty and applied management decisions have led to the collapse of its stock. In the case of the Chilean Jack-Mackerel, this fishery has been managed under a yearly-defined Total Allowable Catches (TAC) regulation, complemented since year 2001 with the operation of an individual (company allocated) quota scheme. The TAC scheme has had a particular concern about the stability of quota levels over time. Additionally, since the mid-2000s the Jack-Mackerel fishery has been one of the pioneering in Chile to include risk indicators in its management practice. Nevertheless, risk indicators are not yet implemented in a formally integrated decision-making framework, but rather like an additional ad-hoc objective aiming at capping biological (collapse) risk. TACs can be considered in general as management procedures (MP) (see Butterworth et al. 1997). In this paper we consider an age structured fishery model, which describes the evolution of its stock and incorporates the uncertainty only in the recruitement. This uncertainty is explained by cycles associated with El Niño phenomenom, and it is represented by a sinusiodal function conputed in previous econometric studies. For this mathematical model, we present a new methodology for comparing different MPs. This allows to deal with the mentioned uncertainties, by comparing different criterias, economical and ecological ones, that one expects to satisfy during a haversting period. This methodology is based on the computation of the probability of satisfying all these criterias during this period, being thus a alternative approach to management strategy evaluation proposed by Oliveira & Butterworth 2004.

Modelling/MO03
Modelling

Parallel agreements in fisheries management

ID paper: 473

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Many commercial fisheries around the world experience spatial coexistence of species and imperfectly selective harvesting gears. This makes these fisheries multi-product industries, that often harvest multi-species or have a bycatch of another (maybe also valuable) species, which may or may not be target species for another fishery. Traditional game theoretic fisheries literature often ignores this above sea interlink of species when applying one species models. Also, in the management setting the interlink between species above sea level is often ignored since these species are managed both biologically and economical separately. This paper explores the biological and the economic consequences of ignoring this interlink, thus making separate management agreements instead of parallel agreement in both a cooperative and a non-cooperative framework. The paper shows that there will always be economic gain from including the knowledge about the interlink in the joint management of species, but the biological consequences for stocks is ambiguous and very dependent on the economic importance of the species. Our results are illustrated by applying the model to the mixed trawl fishery in Kattegat and Skagerrak where there is coexistence in habitat of cod and Norway lobster.

The fleet dynamics component of the mnl markov and sur markov models of managing australia's northern prawn fishery (npf)

ID paper: 246

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The motivation of this paper is to detail the application of Markov chains in simulating fleet dynamics in Australia's Northern Prawn Fishery (NPF). The Markov chains are enhanced through the use of the multinomial logit (MNL) and Seemingly Unrelated Regressions (SUR) models to explain transition probabilities. The terms MNL Markov and SUR Markov are coined, therefore. The MNL Markov and the SUR Markov are novel, as they describe, capture and forecast time-variant (time-inhomogeneous) and time-invariant (time-homogeneous) fleet dynamics within any defined spatial fishery structure. The models yield reliable forecasts, when applied to data-rich fisheries and have a potential of yielding similar forecasts when customised for use in data-poor fisheries. In the paper, the theoretical structure of the MNL Markov and SUR Markov is shown. Results using data from the NPF are provided, and forecasts of reliability are presented. These forecasts can form the pillar of any fishery management strategy evaluation. The two models are novel, and offer a lot of possibilities for answering marine resource use questions with respect to the allocation of fisheries resources. The models represent a unique, simple, effective and novel approach to fishery management, and particularly for understanding the key drivers of effort allocation in fisheries. The original structure of these models is described in detail in Ngwenya (1997), and in an unpublished PhD thesis (Ngwenya, 2001). The MNL Markov and SUR Markov provide a practical way of integrating multiple fisheries objectives, and using economic drivers of fleet dynamics to manage outcomes of a commercial fishery.

Modelling/MO04
Modelling

Ecological, economic and social viability of itq management systems

ID paper: 469

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This paper deals with the sustainable management of a renewable resource based on individual and transferable quotas (ITQs) when agents differ in terms of harvesting cost. In a dynamic bio-economic model, we determine the conditions under which a manager can achieve through a quota market both ecological, economic and social objectives along time. The performance of the TAC setting is evaluated with respect to the satisfaction at each time of constraints on stock, rent and efforts. The viability kernel provides the analytical tool to handle such a feasibility problem. We first show how an equitable and efficient managed fishery needs a relative homogeneity of users. We also prove that a floor stock level is required to reconcile the objectives. In that case we exhibit a range of viable TAC which turns out to depend on the structure of costs, catchability of the agents together with population dynamics.

Multiannual adjustment of fish quota under costly capital adjustment and stochastic bycatch

ID paper: 315

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Stochasticity in both fish stock dynamics and bycatch complicates fisheries management and limits its economic efficiency. Yearly adjustment offish quota results in high public costs as researchers, policy makers and stakeholders gather several times a year to discuss new estimates of fish populations and bycatch. Also private costs are induced, as fisheries capital adjustment is costly and irreversible. We develop a dynamic multi-species fisheries model for a profit maximizing decision-maker. In the model we deal with stochasticity in fish stock growth and in bycatch. We analyze the effects of stochasticity on optimal levels of harvest and capital adjustment. This is done for fisheries management systems of annual and multiannual adjustment of quota. We numerically solve the model and study how optimal adjustment of fish quota can be established in this stochastic setting. The contribution of this paper to the literature is fourfold. First, uncertainties both in growth of fish and in bycatch are accounted for in the model, as opposed to current models of stochastic bycatch and deterministic fish stock dynamics. Second, we include policy costs that are incurred when adjusting fisheries policy. Third, capital adjustment is incorporated in the model in order to address the problem of irreversible and costly investments. Finally, we compare results between annual and multiannual quota systems.

Modelling/MO04
Modelling

Stability and success of regional fisheries management organizations

ID paper: 101

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According to international law, straddling fish stocks should be managed co¬operatively through Regional Fisheries Management Organizations (RFMOs). This paper analyzes the stability and success of these organizations through a game in partition function form based on the classical Gordon-Schaefer bio¬economic model. Results show that the larger the number of fishing states that compete for the fish stock the higher are the relative gains from full cooperation, but the lower is the likelihood of large RFMOs being stable. It is also shown that new entrants increase the incentives of RFMO members to leave and decrease the incentives of non-members to join it. Moreover, the success of coalition formation is positively correlated with the degree of cost asymmetry among fishing states and negatively with the overall level of efficiency.

Viable coalitions in open-access

ID paper: 135

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It is well known that the non-cooperation among agents harvesting a renewable resource is critical for its sustainable management. Fisheries in an open-access context constitute a major example. The present paper gives theoretical insights on the complex balance between coalitions structure, resource state or dynamics and agents' heterogeneity to avoid bio-economic collapses. A bio-economic model bringing together coalition games and a viability approach is proposed to focus on the compatibility between bio-economic constraints and an exploited stock dynamics. It is examined to what extent cooperation promotes sustainability. Based on the Shapley value, a measure of the marginal contribution of the users to the sustainability of the resource is proposed. It suggests that the stability of the grand coalition occurs for large enough stocks. By contrast, for lower levels of resource, the most efficient user plays the role of a dictator. Illustrations based on fishery case studies are given.

A stackelberg analysis of the potential for cooperation in straddling stock fisheries

ID paper: 155

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To ensure the long-term conservation and sustainable use of straddling fish stocks, the 1995 United Nations Fish Stock Agreement calls for the establishment of regional fisheries management organizations to manage such stocks. This paper studies the potential for cooperation in straddling stock fisheries when the cooperative coalition of countries acts as a Stackelberg leader against the remaining singleton countries. It is demonstrated that an increase in the cooperation level leads to an increase not only in the steady-state fish stock, but also in the total rent of the fishery. Further, the outlook for cooperation is better within the Stackelberg game, where the cooperative coalition acts as a leader, than in the Cournot game. At the stable equilibrium of a Stackelberg game, not only is the steady-state fish stock higher, but also the total resource rent, participants rent and non-participants rent are higher than those of the Cournot Nash stable equilibrium. The new-entrant issue is a problem for the conservation of the fish stock in the Stackelberg game. Self-financed transfers with commitments of the initial stable coalition will increase the level of cooperation. The theoretical findings are illustrated by a numerical example of how to reach stable full cooperation.

Multi-jurisdiction quota enforcement for transboundary renewable ressources

ID paper: 255

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Many renewable resources, such as fish stocks, water or environmental quality, are shared between different countries. The management of such resources then relies on international agreements. We develop a model of a shared renewable resource for which there is an international agreement that determines each country's share of total extractions. The government of each country is responsible for the enforcement of their national quota. Governments seek to maximize the value of their country's share of the resource, but also care about sustainability (compliance with total quota). Lowering the level of national enforcement gives firms stronger incentives to violate their quotas. Consequently, even with a sharing agreement in place and national quotas set according to the agreement, the countries can cheat on the agreement by reducing enforcement efforts and thereby inducing its firms to violate their quotas. We analyze the effects of this in a differential game framework. There are two games. First, a Stackelberg game between the government and the extraction firms in each country, which determines national extraction. Second, an enforcement game at the international level between different governments, which determines total extraction. Our results suggest that if the total quota is too low, countries will have an incentive to cheat on the agreement by reducing enforcement efforts. Overly restrictive total quotas may in fact be counterproductive. In this case, the equilibrium resource stock increases as the total quota is increased. Imposing a less restrictive quota removes the incentive to cheat. We obtain a bound on the total quota that must be met for cheating to be eliminated.

Viability of transboundary fisheries and international quota sharing

ID paper: 311

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This paper examines the optimal management of a transboundary resource, the Bay of Biscay anchovy (Engraulis encrasicolus L.), be- tween two countries, France and Spain. It is assumed that both coun- tries use only one type of gear to fish the anchovy, the purse seiner for Spain and the pelagic trawler for France, and that these technologies impact the reproduction of anchovy at diff ering rates via the capture of juveniles. A deterministic model is used to simulate the anchovy dynamics, with the fish stock consisting of two age groups, "young" and "old", while recruitment follows a logistic pattern. A regulatory agency is assumed to allocate the fishing quota between the two coun- tries with the aim of sustainability in the overall allocation design. A set of constraints is defined to describe the sustainability of the system which encompasses the economic, ecological and social aspects of the fi shery. The optimal harvest share between the two countries is found and a number of scenarios are then tested in relation to their ability to remain within the set of constraints, or viability kernel. Scenarios include the historical trajectory, the optimal harvest share trajectory and the minimum time of crisis trajectory.

Past and future management of a collapsed fishery: the anchovy in the bay of biscay

ID paper: 429

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In this paper, we analyze the efficiency of the existing management regime of the Bay of Biscay anchovy fishery, which has been closed since 2005 due to stock collapse. We also study Pareto improving strategies to improve management of the fishery once the moratorium is lifted, expected for spring 2011. The fishing rights are shared between France and Spain. The main different between the fleets is in terms of the harvesting technologies. The existing international agreement establishes the timing of fishing activities and the shares of the stock for each country. The optimality of this agreement is first analytically analyzed using a sequential game framework. Second, the model is calibrated using data from 1987 to 2004, the period between the current agreement was introduced and the fishery was closed down. Our results suggest that the existing international agreement is suboptimal. Several alternative management regimes are suggested and analyzed. The first alternative is to allow for changes and improvements in the technology of the fleets. Second, the creation of a market to rent or sell quota across national borders. Both alternative management regimes are shown to be Pareto improving.

Special session

Essays in productivity measurement in honor of Jim Kirkley

(Productivity Measurement Short title)

Firm behavior under quantity controls: a virtual quantity analysis of input regulation and capital stuffing in a malaysian fishery

ID paper: 78

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How should firm behavior be evaluated in a positive framework when there are multiple quantity controls on inputs and outputs? The answer to this question informs the design of pubic regulation of individual fishing firms. For example, Dupont (1991) considered the relationship between an input fixed by command-and-control regulation and a variable input (capital stuffing), and Asche, Gordon, and Jensen (2007) considered the relationship between a transferable output quota that is a property right and an unregulated variable output when the former is quasi-fixed during a production period. The virtual quantity framework allows the positive analysis of individual firm behavior under existing multiple quantity controls to better design public regulation. This ex-post approach is dual to the ex ante virtual price framework (Fulginiti and Perrin 1993, Squires 1994, Squires and Kirkley 1996), and is used to extend the properties of the elasticity of intensity (Diewert 1974, Dupont 1991). The virtual quantity framework is applied to a Malaysian common resource regulated by license limitation. Program success depends on whether firms can circumvent regulations by substituting unrestricted inputs for the quantity-controlled inputs. The results demonstrate little or no potential for firms to circumvent command-and-control quantity controls on inputs aimed at achieving sustainable use of the common resource. The pervasive input complementarity instead points to quantity controls that can lower harvest pressures on the common resource stock. This result is particularly comforting for a developing country with limited regulatory capacity that precludes output controls or transferable property rights on catches and must instead rely on input controls. Asche, Frank, Daniel Gordon, and Carsten Jensen. Individual Vessel Quotas and Increased Fishing Pressure on Unregulated Species, Land Economics 83:1 (Feb., 2007): 41-49. Diewert, W. Erwin. "Applications of Duality Theory," in D.A. Kendrick and M.D. Intriligator (Eds.) Frontiers of Quantitative Economics, Vol. II. (Amsterdam: North-Holland, 106-171, 1974). Dupont, Diane. Testing for Input Substitution in a Regulated Fishery, American Journal of Agricultural Economics, 73:1 (February, 1991), 155-164. Fulginiti, Liliyan and Richard Perrin. "The Theory and Measurement of Producer Response under Quota," Review of Economics and Statistics, 75:1 (February, 1993), 97-106. Squires, Dale. "Firm Behavior under Input Rationing," Journal of Econometrics, 61:2 (April, 1994), 235-257. Squires, D. and J. Kirkley. 1996. "Individual Tradable Quotas in a Multiproduct Common Property Industry." Canadian Journal of Economics 24(2): 318-342.

Productivity measurement/ ID 503
Productivity measurement

Measuring productivity change in the mid-atlantic surfclam fishery

ID paper: 136

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The Untied States has embarked on a policy path of promoting catch share programs to manage fisheries. These can include a range of programs, from community based management arrangements to individual transferable quota programs (ITQ's). The Mid-Atlantic Surfclam and Ocean Quahog Fishery has the longest running U.S. ITQ program, which was initiated in 1990. Prior to the implementation of the fishery s ITQ program, the fishery was managed primarily through limits on time fished. Early studies of this ITQ program noted initial productivity gains for vessels once the ITQ program was implemented. However, there have been no recent studies which have examined productivity changes. We estimate productivity change through construction of a Malmquist index for the years 1980 through 2008 to capture productivity change before and after implementation of the ITQ regime. We then decompose the Malmquist index to separately examine changes in technical efficiency, capacity utilization and technical change. We find that the early gains of productivity and technical efficiency of the ITQ program have not been sustained. This may be due to the vertical industry structure which has developed under the ITQ regime since 1990. Results suggest that we should be careful about using initial changes in vessel productivity and efficiency to predict the ultimate outcome of implementing a catch share system.

Assessing Opportunity And Relocation Costs When Considering Marine Protected Areas Using A Behavioral Model of Longline Fleet Dynamics

ID paper: 486

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Increasing use of spatial management tools in fisheries requires an understanding of fleet response, and in particular to where displaced fishing effort is likely to move. We develop a state dependent decision-making model to address the spatial allocation of effort in an Australian tuna longline fishery. We assume that fishers have an economic objective in deciding where to fish, but that decisions in any period are also influenced by the remaining quota held at the time of the decision. Key features of the model include endogenous price dynamics, a moving stock and a competitive pool of different vessel types operating from different port locations. We utilize this model to illustrate fleet responses to marine reserves and limits on fishing effort. The results illustrate that the model framework provides advantages over statistically based models in that decisions made in response to the imposition of a reserve are not consistent with a proportional reallocation of effort. Incorporating the opportunity cost of a quota into the model resulted in an optimal utilization of effort, in which effort was concentrated in time periods and locations yielding maximized profit.

Are Spatial Incentives More Cost Effective than Marine Protected Areas for Conserving Biodiversity?

ID paper: 487

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Predicting costs for spatial marine management options requires an understanding of how fishing effort will be redistributed if effort is reduced in particular areas. The pattern of redistribution will determine economic losses due to management, and will be essential for predicting other undesirable outcomes such as increased previously non-encountered by-catch species. Given the role of cost in determining the effectiveness of a particular reserve design, there is merit in considering alternative spatial management methods that could deliver similar benefits at a lower cost. One such option is the use of incentives to influence the spatial overlap between economic activities and biodiversity assets. Australia□s Eastern Tuna and Billfish Fishery (ETBF) provides a useful case study for exploring the potential for spatial incentives as an alternative to marine reserves or fisheries closures.We compare Australia□s current policy of fisheries closures to an alternative policy that uses spatial incentives to reduce fishing effort in environmentally sensitive locations. We use a dynamic state variable model of fleet dynamics to predict the spatial distribution of effort, and thereby target species catches and thus revenues, and expected by-catch of seabirds. We compare four different management scenarios: □no closure□, total closure and two spatial incentives related to hook decrement rates. In order to allow comparison across dissimilar economic, social and environmental impacts as well as take into account different views and priorities of various fisheries stakeholders, we report the projected effects of the management options as utility scores using information from a stakeholder objectives weighting survey.

Special session

Economics of rebuilding fisheries

Rebuilding fisheries (Short title)

Policy Approaches to rebuilding fisheries across the OECD

ID paper: 515

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Governments have committed to "Maintain or restore stocks to levels that can produce the maximum sustainable yield with the aim of achieving these goals for depleted stocks on an urgent basis and where possible not later than 2015" as part of the Plan of Implementation of the World Summit on Sustainable Development. Over the last several years, strategies and approaches to effectively rebuild fisheries that meet biological objectives and also take into account social and economic considerations have figured prominently in the policy debate. However, relatively little is known about how they go about implementing strategies to meet this goal. This presentation provides an overview of the policy approaches and strategies adopted in selected OECD countries

Not provided

ID paper:

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The following questions would be examined and discussed at the Special Session:

- How can the key issues of political economy be adequately considered and addressed in the development of rebuilding plans? Specifically, the institutional and economic issues in national rebuilding programs of OECD member countries would be discussed, as well as the role of stakeholders in the rebuilding process (challenges and opportunities).

- How are fishing mortality paths calculated in terms of reference points, limits, targets and timeframes and what are the economic implications of the possible rebuilding scenarios? While the development of such paths has been largely a biological question, there are significant economic consequences that may or may not be considered. In particular, the modelling approaches to assessing rebuilding trajectories will be discussed (e.g. Bioeconomic modelling and management strategy evaluation).

- What happens if assumptions about rebuilding are incorrect and the stock is not rebuilt as predicted - what are the implications for policy makers and fisheries managers?

- Is it correct to assume that all stocks can be rebuilt and what policy issues will need to be addressed if there are irreversible changes to ecosystems?

Management Strategy Evaluation and Management Procedures: Tools for Rebuilding and Sustaining Fisheries

ID paper:

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Fisheries management is complicated in nearly all cases by a high degree of uncertainty about the current state and expected growth of fish stocks and about the economic and social factors that affect the desirable harvest levels. Even for fisheries with excellent data collection programs, scientific surveys and sophisticated assessments, the estimates of catch levels that will maintain healthy fisheries or rebuild depleted ones are often far from accurate. Consequently recommended catch levels often fluctuate more than necessary in response to error in assessments rather than true stock variability and frequently react too slowly due to lags in data collection, assessment and implementation. Overly optimistic estimates of stock size and future growth have often led to allowing catch levels that undermine rebuilding. Fishery management strategies also rarely include specific objectives developed with stakeholder involvement which can undermine stakeholders' support for conservation even when it may be in their best interest. In this presentation, I discuss an approach for evaluating and implementing fishery management strategies known as management strategy evaluation (MSE), also sometimes referred to as the management procedure (MP) approach that is designed to identify and operationalize strategies for managing fisheries that are robust to several types of uncertainty and capable of balancing multiple economic, social and biological objectives. When implemented correctly an MSE should result in clear and measurable objectives and a robust process for achieving them that fishery managers and stakeholders have jointly developed and agreed to. I review several examples of MSEs that have been used to evaluate, and in some cases implement, rebuilding strategies for overfished fisheries. These case studies demonstrate how the MSE approach has been applied and some of its advantages and limitations.

Practical Considerations in Using Bioeconomic Modeling for Rebuilding Fisheries

ID paper:

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This presentation will attempt to focus exclusively on the use of bioeconomic modeling for rebuilding fisheries. To that end, bioeconomic modeling in general – and dynamic bioeconomic modeling in particular – is vital to the fisheries management process. This is because fisheries may need rebuilding for reasons unrelated to the biological characteristics of the stock. These reasons include anything the affects the decisions of fisherman such as changes in the management of the fishery, general economic conditions, the profitability of fishing, the demand for alternative uses of the stock, the supply of substitutes, trade patterns and consumer preferences. First, we provide a brief background on current rebuilding paradigms that includes the identification and discussion of five commonly held assumptions regarding rebuilding. Then we summarize the theory of bioeconomic modeling as it relates to managing a fishery during rebuilding. Information will be provided on how bioeconomic models can, have been, and are being considered for use in rebuilding various fisheries, and how it can be used with the management strategy evaluation (MSE) approach. Several case studies will be used to illustrate these points. Lastly, some practical information regarding the use of bioeconomic models will be summarized in order to clarify the policy relevant use of this modeling tool.

Fisheries rebuilding challenges for RFMOs

ID paper: 515

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A central component of the OECD project is a series of case studies of fisheries rebuilding plans at national and international levels that are intended to identify the economic, social and institutional factors underlying the success or otherwise of rebuilding programs.This presentation will present the findings of work on the rebuilding of two international fisheries managed by Regional Fisheries Management Organizations (RFMOs) – the Southern Bluefin Tuna fishery managed by the Commission for the Conservation of Southern Bluefin Tuna (CCSBT) and the Greenland Halibut fishery managed by the Northwest Atlantic Fisheries Organization (NAFO). These two case studies demonstrate that RFMOs are dealing with difficult issues surrounding conflicting individual States national interests and how this plays out in formulating and implementing rebuilding strategies for depleted discrete, highly migratory and straddling stocks.

Recreational fishing

Creation of guidelines for assessing social and economic benefits of european inland recreational fisheries european inland fisheries advisory commission (eifac) occasional paper no. 45

ID paper: 284

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Upon request by the European Inland Fisheries Advisory Commission (EIFAC), group of prominent economists and other social scientist were assembled to create a set of guidelines for assessing socio-economic benefits of the European inland recreational fisheries. A wide range of international interest groups and academics were included in this process that has resulted in a document aimed at politicians and other non-economist, non-social scientists. It is hoped that this document will be used with the European community to better utilize the social sciences in the creation of inland fisheries policy. The guidelines help users select the proper methodologies using secondary data, and, if secondary data does not exist, helps users to decide what primary data needs to be collected and how to collect that data. This presentation will chronicle the development and content of the guidelines with particular attention to difference in European and North American fisheries management.

Recreational fishing/ ID 5
Recreational fishing

Summer flounder allocation analysis

ID paper: 286

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Summer flounder is an important commercial and recreational species in the Mid and North Atlantic regions of the United States. The stock has been undergoing rebuilding since 1993 and is not currently overfished but is not yet recovered. Within this fishery, commercial and recreational quotas are often exceeded. Current allocation is roughly 60% commercial, 40% recreational and the recreational quota is shared between private anglers and for-hire recreational providers. Also, through the years, the allocation has crept in favor of the commercial sector. Because the stock is rebuilding, recreational effort has been increasing. A recovering stock plus increasing recreational effort has resulted in a downward spiral of more restrictive regulations. With increasing abundance and increasingly restrictive regulations, both commercial and recreational users feel they are being kept out of the fishery unnecessarily. As a result many users feel the current allocation is unfair. This study examines the current allocation and makes recommendations as to the optimal allocation between recreational and commercial users based on the equimarginal principle. Commercial estimates of the marginal value of a pound of summer flounder are generated using a dual revenue model of this multi species fishery. On the recreational side, several random utility site choice models are estimated for summer flounder harvest using the Marine Recreational Fisheries Statistical Survey (MRFSS), including a model weighted to account for choice based sampling in the MRFSS survey. Proxy estimates are generated for the for-hire recreational industry because no cost and earnings data exists for this sector. Consumer marginal values are generated using an almost ideal demand system using dockside prices. The report concludes that the allocation should move in the direction of the recreational sector, perhaps significantly. Unfortunately, uncertainty in the recreational estimates and limitations in the recreational demand modelling make it impossible to define the optimal allocation point.

Economic approach to fisheries management and allocation with short run diminishing stocks

ID paper: 245

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In the standard economic approach to optimal allocation, aggregate economic benefit is maximised where the sustainable harvest is allocated so that marginal net benefits are equal. The model assumes a known sustainable harvest. It also assumes optimal intrasectoral allocation in each sector. The Western Australian West Coast demersal fishery, like many fisheries, is based on a common fish stock exploited by both commercial and recreational fishers. A multispecies fishery, it includes prize species such as dhufish and pink snapper that are iconic for recreational fishers and highly regarded commercial table fish. Recent stock assessments have concluded that stocks are under threat and significant restrictions have been placed on both commercial and recreational fishers. The management framework must now deal simultaneously with reducing aggregate harvests and achieving optimal allocation. This paper applies the economic model of optimal allocation to establish a benchmark allocation for the iconic species baldchin groper, pink snapper and dhufish, using survey based estimates of the marginal economic surplus from commercial and recreational fishing. Current restrictions are evaluated against this benchmark economic optimum to determine how well they align with the model and what adjustments might be appropriate. Empirical lessons based on data collected from commercial and recreational fishers in the fishery are used to also consider whether the basic economic model of allocation is itself in need of refinement to deal with the current circumstances, in particular the changes in recreational fishing behaviour that might involve switching effort to the less constrained non iconic species.

Understanding rent dissipation and optimal management in recreational fisheries: theory

ID paper: 380

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Recreational fisheries are severely understudied by fisheries economists, in spite of their growing importance in the context of fisheries management. While recreational demand models have been extensively applied to recreational fisheries, they have rarely been successfully integrated with bioeconomic models to evaluate policy changes. Furthermore, theoretical models of open access behavior have presumed a process of rent dissipation that closely mimics models of the commercial fishery this despite the fact that there is serious cause to doubt the hypothesized mechanisms for such dissipation and the consistency of the underlying models with received consumer theory. Addressing these shortcomings is important as interest in adapting instruments designed for commercial fisheries to the recreational context increases. We remedy this gap by developing models of open access and optimal dynamic management of recreational fisheries that are consistent with current developments in recreational demand analysis. We incorporate a number of realistic aspects of the recreational context, namely: 1) the existence of multiple substitutable recreational sites of varying proximity and (endogenous) biological characteristics; 2) the ubiquity of (unobservable) angler heterogeneity in preferences; and 3) the potential for corner solutions (zero visitation) by some sub-population of potential anglers. Our model yields a number of insights concerning the nature of rent dissipation in recreational fisheries and how it is shaped (and limited) by factors such as the number of substitute sites and their spatial configuration and biological connectivity. Our modelling also calls into question the usefulness of a representative agent framework in bioeconomic models of optimal fishery management.

Indirect benefits and fisheries management

ID paper: 522

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Indirect benefits have a long and undistinguished history in the literature of benefit-cost (B-C) analysis. A common measurement tool for indirect benefits is the Leontieff or Input Output Model (I-O), and this paper discusses indirect benefits as if they are identical to I-O analysis. The B-C literature generally disparages I-O for assessing the economic efficiency of a project but does admit its possible usefulness in connection with distributional considerations, including inter-jurisdictional cost sharing. In fisheries, I-O is especially problematic for reasons discussed in this paper. To illustrate, the paper draws on recent research on Mid-Atlantic recreational fisheries. The nature of fisheries is such that it is an especially ill-suited tool. In a concluding section, a way is suggested whereby I-O could be useful. It appears that this application may be better suited for the commercial fisheries than for recreational fisheries.

The role of recreational fisher modelling in the assessment of management options for Australia's west coast demersal fishery

ID paper: 521

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The paper develops a model of recreational fisher behaviour in which fishers maximize their individual utility by adjusting fishing time, trips, catch and size of fish caught. It investigates the optimal behaviour or an individual fisher with and without constraints such as bag limits. The model is used to assess how constraints such as bag limits affect the optimal number or trips and fishing time. It investigates how an improvement in abundance, as reflected in expected catch rates, will impact upon trips and fishing time. This has implications for the likely success of management options designed to enhance abundance. The model is used to indicate what adjustments (e.g. fees, closed seasons) are potentially needed in situations where there is a positive response to an improvement in catch rates. .The theoretical model is general. The empirical analysis is for the West Coast Demersal fishery using previously collected survey data on individual fishers. This data is used to estimate a trip function in which annual trips are variously a function of catch rate, trip cost, income, species targets and satisfaction to derive an estimate of the responsiveness fishing trips/time to catch rates.

Wall street or pacific stocks? an analysis of the historical drivers of sportfishing demand

ID paper: 80

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Recent aggregate models of recreational participation have largely focused on demand systems and choice models utilizing cross sectional data. While these strategies may be advantageous for the estimation of welfare measures, they have left unexplored the relationship between recreation participation and general temporal economic trends. This research shifts its focus to the impact that general economic trends have on recreation participation while controlling for endogenous factors that impact demand through changes in quality. This research develops a theoretical model of consumer participation for recreational fishing being conditionally dependent on economic and fishing characteristics, such as fish stock and climate. The model is applied to a unique time series of commercial recreational fishing effort within the Southern California tuna charter and party boat fleets between 1950 to 2008. The demand for fishing effort is estimated utilizing an auto-regressive framework incorporating both economic and fishery characteristics; the analysis includes the testing of structural breaks in demand for fishing effort while allowing for technological change within the fishery. Empirical results illustrate that changes in relative recreator effort within the fishery are driven by both economic and fishery characteristics. Results support the calculation of cross elasticity estimates of income and fishery characteristics on fishing effort. The research suggests that single period or panel data analyses may neglect to account for changes in demand for recreation due to macroeconomic, biological, and environmental conditions which can be captured through time series analysis. Failure to indentify these effects may lead to biased estimates.

A microeconomic foundation for recreational effort functions

ID paper: 406

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Recreational fishermen quickly adjust fishing effort directed at a specific site to variations in fishing quality. Holding all other quality parameters constant, the functional relationship between fish abundance and the resulting recreational fishing effort is denoted an effort response function. This paper proposes a Cobb-Douglas utility function for the benefits of recreational fishing to explain effort response functions with microeconomic theory. Depending on the relative weight of catch within the utility function, a concave, convex or linear effort response function results.

Predicting resource management benefits by simulating angler demand and supply responses

ID paper: 404

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This paper describes how the product travel cost approach and simulation modelling can together be used to improve resource managers ability to estimate the benefits of sport fishery resource management. Simulation models of angling demand and supply estimate changes in consumer surplus in response to a wide variety of posed changes in angling quality at specific locations. Credit Valley Conservation, near Toronto, Canada, sponsored the development of this model to guide resource management decisions, such as watershed protection and access enhancement. The product travel cost methodology assumes that each angler chooses from a selection of angling opportunities (i.e., products) based on access cost (i.e., travel cost) and the nature of each angling product. Analogous to demand modelling for retail products, like varieties of wines, demand equation systems are estimated assuming anglers choose among simultaneously-available angling products and their prices. Therefore, this approach models both demand and supply more conventionally than random utility models. Key factors defining angling products (e.g., success rate, fish size, quality of natural environment) are derived from angler travel patterns: Anglers are assumed indifferent between sites providing identical angling products and choose the lowest cost site. Average estimated angler consumer surplus was $40 per angler day, ranging from $9 to $148, depending on angling product, location and season. Changing angling attributes at a site, via resource management, change its angling product, thereby altering angling supply in the system. Therefore, the benefits of any management action not only differ from average CS values, but are also site-specific.

Recreational fishing/ ID 5
Recreational fishing

Evaluation of management strategies in Ningaloo Marine Park, Western Australia

ID paper: 304

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The spatial, multi-species nature of coral reef fisheries makes them notoriously difficult to manage. We have developed simulation models to examine the effect of management options on recreationally important tourist destination Ningaloo Reef in Western Australia where the recreational target species is spangled emperor (Lethrinus nebulosus). Results from the model will provide a means to assess, test and ultimately improve the effectiveness of management and monitoring strategies for the key target species and the the users that rely on it in the region. This is achieved by bringing a broad range of physical, biological and socio-economic information and process understanding into an integrated framework. It also provides an effective interface with management. Model results show the effects of historical fishing mortality, localised depletion of spangled emperor, and the potential effect of the sanctuary zones that are closed to fishing. They also show expected recreational catches and catch rates under different projected effort and management scenarios in the future. These models are valuable tools for Management Strategy Evaluation and in their current form can evaluate a range of management options including area closures, effort restrictions, changes to size limits and gear restrictions, and the expected spin-offs to the regional economy.

Transversal issues

North-East arctic cod model

ID paper: 224

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The international council for the exploration of the seas (ICES) publish annual reports on fish stock assessments. Based on the stock assessment data for the North-East Arctic cod we estimate the effective fishing mortality, establishing coefficients for the catchability-at-age and the annual fishing effort. The fishing effort estimates are then used in the estimation of a cost function for the Norwegian harvesting of the stock. Furthermore, we estimate stock-recruitment relationships of the North-East Arctic cod. The recruitment is influenced by climatic conditions at the time of spawning, and we incorporate this by controlling the sea temperature in the stock-recruitment relationship, and found that the stock-recruitment was increasing in the sea temperature at the time of spawning. These and other features will be used in analysis of how climate change affect the stock, the implications for the fisheries with respect to sharing of the stock between Russia and Norway, and the socio-economic consequences of climate change on communities and industry.

Transversal issues/TI01
Climate Change

Climate change and fisher behavior in the bering sea pollock fishery

ID paper: 258

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One component of the Bering Sea Integrated Ecosystem Research Project (BSIERP) is a spatial economic model that predicts changes in fishing activity in the Bering Sea pollock fishery that may result from climate change. Models such as the one employed here have been used in the Bering Sea and elsewhere to model how fishers make decisions about where to fish. Commercial fishers choose different areas to fish based on observable and unobservable characteristics of the area and the fisher. We commonly model location choice as a function of the expected revenue in an area, fuel and fish prices, distance to an area, vessel characteristics, and to a more limited degree, institutional and environmental conditions. In the Bering Sea pollock fishery, climate variables affect many aspects of the fishing decision. Key among these aspects is the role that climate has on fish location and abundance and the impact that weather plays in daily participation and location choices for smaller vessels. In this paper, we develop a model of the AFA pollock catcher processor fleet. The spatial economic model can incorporate climate data (e.g., ice cover, SST, wind) into the model, permitting us to determine the relative impact of observable contemporaneous environmental conditions on location choices. We also develop a framework to include predictions of changing pollock abundance in the model, which will allow us to estimate fisher responses to scenarios developed by oceanographic and ecosystem modelers involved in Bering Sea project. We also discuss similar modelling of the other sectors of the pollock fishery and the Pacific cod fishery.

Norwegian salmonid farming and global warming: Spatial distribution and value adding

ID paper: 343

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The spatial distribution of Norwegian salmon farming depends on license allocation and physical conditions, with politicians defining the former. Currently, relocalization of these is not permitted. With an expected temperature increase in Norwegian waters, this study analyzes increased temperature s impact on the spatial distribution of production and employment. Four scenarios are investigated over a 30 year timespan: - No relocalization and stable temperature - No relocalization and increased temperature - Free relocalization and stable temperature - Free relocalization and increased temperature Temperature has a major effect on fish growth. The production model predicts annual salmon production per year and county, utilizing a simplified approach to model a complex relationship. Total production is based on linear market growth, serving as a restriction in the subsequent model. Productivity per county is determined in a temperature-driven model, and another model predicts the relocalization of licenses. Measurements of industrial statistics like value added and employment are important for policymakers. An input-output model captures the direct and indirect effects of aquaculture production in each county, comparing these to the base scenario. Preliminary findings indicate substantially differing effects on the spatial distribution of production and hence value adding and employment. In the baseline scenario, production growth is relatively equal among the northern, middle and southern parts of Norway. Increased temperature yield shifts production considerably north, both in case of stable and liberalized management.

Transversal issues/TI01
Climate Change

Arctic fisheries: potential management issues and opportunities

ID paper: 359

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Although considerable research is required on the impact of global climate change on fisheries the general expectation is that climate warming in the Arctic will improve conditions for many fish stocks. Climate warming is taking place faster in the Arctic than elsewhere on the planet. The reduction in sea ice should enhance production and recruitment. Habitat areas could expand and species composition change. The diminishing ice cover and new habitat areas will attract those wishing to exploit the increasingly available fish stocks. However, the current international management and policy framework for Arctic fisheries management is not regarded as adequate for the large challenges looming. Revised and new agreements are necessary. Fisheries management in the Arctic is complicated by changing environmental conditions as the impacts of climate warming continue to be felt, the evolving territorial claims of Arctic states, the attractiveness of the Arctic as a source of oil and gas and a transportation route, and the lack of infrastructure. The Arctic could play a pioneering role in fisheries management by establishing a management organization that avoids rent dissipation through excessive fishing effort, has the ability to adapt to a changing natural environment, protects the rights of indigenous peoples, and anticipates changes rather than reacting to them. This paper will review the likely impacts of climate changing on Arctic fisheries, the current status of management agreements in the Arctic, the difficulties in formulating new management agreements, and principles on which new management agreements could be based.

Climate change and fisheries in bangladesh: impacts and adaptations in the context of marginal and poor fishers

ID paper: 69

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This paper looks at the possible consequences and adaptations to Climate Change for fish and people, particularly the marginal and poor fishers in Bangladesh. Fish from Bangladesh s vast inland waters are vital to millions of marginal and poor people, but catches and species diversity have been declining due to the problems, like climatic vulnerabilities, habitat degradations, draught, water-logging, etc. Bangladesh is likely to be one of the most vulnerable countries in the World to the climatic vulnerabilities. Climate change is the most serious and biggest challenge for marginal and poor fishers in the rural areas, mainly in the disaster-prone haor and river basin, monga-prone and coastal belt of the country-side. It is observed that during the monsoon, salt-water intrusion from the Bay of Bengal affects the agriculture and fisheries within the 100 kilometers of the country-side. This paper gives an account on the potential impacts of climate change on the fisheries and people, and the feasible adaptations, which have been tried and succeeded by the affected marginal and poor fishers of the country over the last decade. Bangladesh is proven to be a resilient on these and the lessons learnt and best practices should be disseminated to other developing countries, which are also affected due to climate change. Both quantitative data and qualitative findings from the secondary sources are used to draw conclusions and recommendations for future directions. Adaptations to climate change for the marginal and poor fishers of the vulnerable areas have been given much attention in the paper.

Transversal issues/TI02
Climate Change

Economic impacts of climate change on Australian fisheries and associated sectors by 2030

ID paper: 138

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This study investigates the economic impact to fisheries and associated sectors if wild and farm fisheries continue operating to 2030 without considering the effects of climate change. Estimates of climate change impacts in Australian fisheries and their associated probability distributions were derived from the literature and expert consultations. An Input-Output model of the Australian economy was used to determine the flow-on effects of these impacts. Monte Carlo simulations were undertaken on the basis of the associated uncertainties to climate change predictions. The results present a baseline for evaluating the benefits of future climate change adaptations. The results, based upon the best available biological projections, indicate most Australian fisheries considered may in fact see economic benefit as a result of climate change by 2030. Nevertheless, the highly valuable abalone and salmon fisheries could experience losses.

Optimal management of the baltic sea fishery under climate change: an ecological-economic age-structured multi-species model analysis

ID paper: 461

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To achieve sustainable fisheries, ecosystem-based fisheries management yields increasing attention. However, so far mainly single-species models are used to develop management advice, not accounting for species interaction. In particular many traditional fisheries economic models have been criticized by biologists, especially if results were gained by rather simple biomass models. Therefore, age-structured ecological-economic models have the potential to foster communication between economists and stock assessment scientists. Biological assessment models, on the other hand, rarely explicitly take into account economic considerations. To overcome these shortcomings, we develop an age-structured, multi-species fishery model that incorporates dominant biological interactions like predation via multi-species models. Given the ultimate goal of providing most appropriate management advice for the operating fishery we adopt an economic objective function (present value of resource rents) and determine optimal management. In the Baltic Sea, the stock dynamics of the 3 most important fish species cod, herring and sprat are strongly interlinked by predation as well as competition. Accordingly, we develop a biological multi-species model that can be used to predict coupled stock dynamics under different management scenarios. We include environmentally-sensitive stock-recruitment functions in the model and simulate stock trajectories for a period of 30 years under an assumed climate change scenario. By further adding an age-structured ecological-economic model, we derive the optimal multi-species management strategy in terms of net present value of resource rents. We evaluate the cost (as deviation from the optimum) of alternative management scenarios, e.g. when introducing side-conditions on minimum stock sizes or maximum year-to-year changes in the fishery. Specifically, we evaluate the economic and ecological sensibility of the present long-term management plan for Baltic cod in a multi-species framework.

Consumer preferences for coastal restoration: ecosystem services and individualized pricing in an experimental auction market

ID paper: 208

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Increased demands on our coastal ecosystems, due to increased development, over-fishing and population growth are threatening many environmental goods and the amenities associated with these well functioning ecosystems. Few to no markets exist for ecosystem services, such as those provided by healthy sea grass beds or water quality benefits associated with clam habitats, yet consumer preferences can provide insight to managers and policymakers on how to prioritize limited funding and make trade-offs between coastal restoration priorities. While willingness-to-pay techniques have been used to estimate preferences on many environmental goods, this study goes a step further to explore real money auctions that generate revenues sufficient to pay for restoration activities, grounded in Lindahl s marginal benefit theory for public goods. Empirical analysis focuses on public valuation for three specific types of ecosystem activities (sea grass restoration, bird habitat and shellfish restoration) in coastal Virginia. Data was collected using a field experiment employing an experimental auction approach and mechanisms to reduce free riding often seen in the experimental economics literature. Preliminary results suggest that individual participants do not have different relative values for specific ecosystem restoration activities, but value them equally on a per-unit basis. This result may be specific to the presentation used in this experiment or part of a broader trend indicating that consumers do not identify all the benefits accruing to them from a particular type of ecosystem restoration. Results also indicate that participants were making decisions consistent with theory while simultaneously generating adequate funds to provide the public goods.

Transversal issues/TI03
Value of ecosystem services

TEV (total economic value) analysis of a marine environment in norway

ID paper: 333

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The push for ecosystem based management has opened up not only for including more of the natural systems when managing fish resources, but also a broader perspective on the human systems, and the diverse activities in the sea. This is reflected for instance in the EU Maritime Policy where fisheries is just one of many activities that marine management must take into account. Research into valuation of natural resources has shown that non-use values may be substantial in the marine environment; These are e.g. existence values, such as the existence of rare species and benthic components as corals, and option values with regard to potential future applications, e.g. in marine bioprospecting. In addition indirect use values, such as habitat values, recreational values and nutrient cycling often far exceed the direct use values, which are typically the value of the fisheries, aquaculture and marine tourism. Applying and critiquing the Total Economic Value (TEV) set up we have estimated marine direct use values, including fisheries and aquaculture, indirect use values and non-use values in Nordland county in Norway, specifically connected to the Lofoten-Vesterålen marine area. Lofoten-Vesterålen is the most important spawning ground for important fish resources such as cod and herring, and it is also a very popular tourist destination. Yet when studying some of the other values that the marine environment supplies, these traditional values are not necessarily the most important.

An application of stated preference non-market valuation to value improvements to threatened and endangered species

ID paper: 411

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Non-market valuation research has produced value estimates for over forty threatened and endangered (T&E) species, including mammals, fish, birds, and crustaceans. Increasingly Stated Preference Choice Experiments (SPCE) are utilized for valuation, as the format offers flexibility for policy analysis and may reduce certain types of response biases as compared to the more traditional Contingent Valuation method. Additionally, SPCE formats can allow respondents to make trade-offs among multiple species, providing information on the distinctiveness of preferences for different T&E species. In this paper we present results of a SPCE involving three U.S. ESA-listed species: the Puget Sound Chinook salmon Oncorhynchus tshawytscha, the Hawaiian monk seal Monachus schauinslandi, and the smalltooth sawfish Pristis pectinata. We estimate values for improving each species ESA listing status and statistically compare WTP among the three species using a method of convolutions approach. Our results suggest that respondents have distinct preferences for the three species, and that WTP estimates differ, depending on the species and the level of improvement to their ESA-status. Further, we find that even slight improvements to all three species seem to be more valuable than scenarios where one or two species recover but the third species remains at its status-quo level. Our results should be of interest to researchers and policy-makers, as we provide value estimates for three species that have limited, if any, estimates available in the economics literature, as well as new information about the way respondents make trade-offs among three taxonomically different species.

Transversal issues/TI04
Value of ecosystem services

Marine dependence and wtp for red tide prevention, mitigation, and control strategies in florida

ID paper: 413

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Red tides are algal blooms that have caused significant ecological and economic damage in Florida. Different nations and regions have addressed harmful algal blooms such as red tides a variety of ways including distinct strategies designed to prevent, control and or mitigate the negative effects of a bloom. While a variety of strategies exist and many have been implemented around the world, the suggested use of some strategies has faced severe opposition in Florida. Opposition is strongest among representatives of the tourism sector that fear the collateral environmental damage than some strategies may cause. To determine the potential acceptance of alternative red tide strategies and, in particular, to determine the correlation of preferences with an individual s dependence on the quality of the marine environment (either for recreation or livelihood), we sent questionnaires to 14,400 Florida residents and invited 692,431 to answer online by email. The mail questionnaire included three dichotomous choice contingent valuation questions (one for each type of strategy) with follow-up on their certainty. The strategies were randomized for order and price level. The internet survey included a polychotomous choice response format that can be used to estimate general support. We will explain residents overall preference across strategies as well and the factors that affect each, including dependence on the marine environment. Results can be used to help summarize public opinion, inform policy makers, guide future extension efforts, and evaluate specific programs intended to address the potentially harmful effects of red tide events in Florida.

A bayesian decision framework for identifying and evaluating ecosystem service tradeoffs for marine protected areas

ID paper: 276

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Existing research on the effectiveness of marine protected areas narrowly focuses on developing sets of management indicators tied to outcomes described in management plans or on the achievement of a single objective such an increase in the size or number of older, more fecund female fish in a protected area. These approaches, however, fail to capture the dynamic complexity of social, cultural, economic and ecological processes, uncertainty and tradeoffs associated with the establishment and operation of marine protected areas. Moreover, there is usually little recognition of local coastal communities, including fishing communities, and the values they hold in the evaluation of the relative benefits and costs of marine protected areas. We describe a Bayesian-based multi-attribute decision support framework for evaluating and assessing economic and ecosystem tradeoffs associated with marine protected areas and other forms of marine spatial planning. This framework integrates fisheries and biophysical data and community-based social and economic evaluation methods. It identifies ecosystem services, their benefits and associated uncertainties in assessing the economic and social tradeoffs associated with changes in the use of the marine environment. We describe the proposed application of this framework to two pilot marine protected areas off the West coast of the United States. The outcome of this study promises to be a valuable case study of tradeoffs in ecosystem services that is widely to both data poor and data rich fisheries and marine regions of the world.

A spatial bioeconomic model of west indian ocean tuna fisheries. assessing mpas relevance for highly migratory species

ID paper: 133

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Indian Ocean Tuna fisheries after a rapid development period from seventies to the end of the last century are faced with challenges including: the fishing capacity control, the profitability improvement, and the limitation of impacts on high seas biodiversity. In this area, tuna species are exploited by coastal states as well as distant water fishing nations within and beyond exclusive economic zones (EEZ). This complex system where countries are exploiter or/and owner of migratory resources is also subjected to exogenous forcing factors such as: markets (tuna prices, fuel costs), environment (ENSO effects, climate change), and geopolitical relationships. A better sharing of the fishing rent between both regional and distant water fishing countries through counterpart agreements, bargaining and royalties remains to highlight. It looks also important to assess the pertinence and impacts of different management options. Among them, marine protected areas (MPA) implementation within either EEZ or international waters is currently discussed. The management through MPAs is expected to limit failures caused by conventional management tools but it also increases the system complexity because countries that exploit fish stocks make face diverse interests. We model an area based-management system that takes into account to biological, economic and social aspects of tropical tuna fisheries. We shall present and discuss features of a multi-fleets, multi-gears and multi-species bioeconomic model applied to Indian Ocean. In this spatial model, economic outcomes expected to fishing activities by metiers and countries are greatly dependent on MPA design. Some scenarios depending on MPA characteristics (size, location, age to protect&) will be also presented and discussed.

Transversal issues/TI05
Marine protected areas

Fishing effort response to a spatial closure: rockfish conservation area in california

ID paper: 262

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This paper analyzes the effects of spatial closures on the multi-species groundfish trawl fishery in northern and central California. The analysis differentiates between changes in total effort and in the spatial distribution of effort before and after implementation of the closures. We use logbook data on the location and duration of trawls. Our comparative analysis divides vessels into groups based on fishing patterns prior to the closure. Additionally, we test for differences in total effort and in the likelihood of exiting the fishery between groups to assess whether implementation of the closures influenced total effort in the fishery. We also examine the proportion of effort in various fishing locations before and after the closures to determine which locations, if any, experienced increased fishing effort. Our results contribute to an understanding of the relative magnitudes of two important effects of marine reserves reduction in total fishing effort and redistribution of fishing effort. The first effect, change in total effort, has implications for the viability of coastal fishing communities and raises questions about whether other fishery management options are more appropriate for reducing total effort. The second effect, effort redistribution, affects the ability of marine reserves to achieve ecological and stock rebuilding objectives. In the case of the California groundfish trawl fishery, effort redistribution may also shift fishing pressure to alternative target species that are present in the remaining open areas.

What do MPAs actually cost fishers and are estimates of forfeited gross value of product an adequate proxy measure?

ID paper: 301

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Establishing marine protected areas (MPAs) often results in fishers being displaced from at least some of their existing grounds. A direct consequence of this is that governments may be required to make compensatory payments to the firms that are affected. Experience has demonstrated that these payments can be significant, as was the case in the Great Barrier Reef representative areas program (RAP), and must be accounted for when planning an MPA. Australia is currently undertaking a process of marine bioregional planning that will result in a series of MPAs being implemented throughout the whole range of their coastal zone. Within Australia, the costs imposed on fishers are generally estimated by calculating the gross value of product (GVP) lost due to exclusion from their historical grounds (based on historic catches). Yet, this assumes low adaptive capacity on the part of the fishers and as such may not be an accurate reflection of the marginal costs actually being imposed on vessels. If so, there is a danger that compensatory payments may be overvalued and are ultimately more akin to one-off subsidies or windfall payments. In this paper we consider a number of potential MPA scenarios that relate to Australia s Eastern Tuna and Billfish Fishery (ETBF). Anticipated costs to industry are first estimated in terms of GVP and then through a location choice modelling approach where effort is displaced as opposed to being removed. This allows the different approaches to be compared directly and the suitability of GVP as a measure of cost discussed.

Transversal issues/TI05
Marine protected areas

Protected Areas for conflict resolution and management of recreational and commercial fisheries

ID paper: 15

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This paper investigates interactions between recreational and commercial fisheries. It introduces the idea of a protected area for recreational fisheries, as a way to reduce conflict between the two sectors and to preserve the natural resource. It is demonstrated that without a protected area for recreational fisheries, open access may imply that only one sector survives. A protected area can assure the operation of both sectors, even under open access. This measure also enhances the aggregate fish stock and the aggregate harvest, both in open access and in the optimal management of recreational fisheries, even if commercial fisheries operate under an open access regime.

The complementarity of no-take marine reserves and catch shares for managing the coral reef line fishery of the great barrier reef

ID paper: 283

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Management changes in the coral reef fin fish fishery of the Great Barrier Reef provide a natural experiment of the efficacy of combining no-take areas and dedicated catch shares. A spatially-explicit bio-economic model of the fishery is used to analyze the tradeoffs between biomass and the net returns from fishing under different management regimes. Results for the scenarios examined show that: (1) the more the fishery is depleted, the greater are the payoffs from combining catch shares with no-take marine reserves; (2) a lower harvest while at high rates of exploitation only lowers net returns slightly for a wide range of reserve sizes; and (3) an increase in the reserve area from when it is zero or small- sized leaves net returns virtually unchanged at any catch level. Thus, catch shares and reserves are complementary and, when used jointly, promote lowering of TACs if rates of exploitation are high and increasing reserve sizes when no-take areas are small.

Transversal issues/TI06
Marine protected areas

Impact of marine protected areas to fishery profitability and income distribution. Evidence from the Gulf of Thailand (Chumphon Province)

ID paper: 221

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Methodological difficulties, particularly when multifleet-multispecies fisheries are active, explain pro parte a weak research effort on the societal benefits and costs of fishing activities after the implementation of a marine protected area. By comparing a marine protected area (Mu Ko Chumphon National Park) and an unprotected area (Chumphon Province) in Thailand, our research effort has prioritized two components of the societal benefits and costs: the fishing unit profitability and the fishery household income distribution. The sampling unit was the fishery household forming one or several fishing ubits defined by a métier: 126 households forming 225 fishing units have been surveyed. The positive impact of the MPA on fishery profitability is shown by a principal component analysis which indicates that there is a lower proportion of fishing units harvesting inside the MPA (insiders) which face negative profit then those fishing outside (outsiders). This positive impact is confirmed by the performance of Chi-square tests: the insiders have relatively higher profit per fishing day than outsiders and a test shows a greater homogeneity of profits per fishing day by a lower variability for the insiders. A steady social impact from the MPA on fishery income distribution is revealed by the measure of concentration, using an Herfindhal index and Lorenz curve which show the more egalitarian structure of insiders regarding the fishing revenue and the fishing profit per household. An other significant socio-economic impact is the higher wage rate obtained by the fishing units of insiders.

Assessing the impact of mpas on recreational uses of a marine ecosystem: the case of the côte bleue marine park (france)

ID paper: 207

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Though the basic purpose of MPAs is marine ecosystem conservation, the question of their influence on the local economy is often critical since it governs their social acceptability. This paper addresses the problem of measuring the consequences of creating a marine protected area (MPA) on recreational extractive and non-extractive uses of the ecosystem (scuba diving, snorkelling, sport fishing). In the first part, we analyse the results of several field surveys dedicated to scuba diving and recreational fishing activities in the Côte Bleue Marine Park , along the French Mediterranean coast. These surveys have been performed in 2006-2009, within the framework of two multidisciplinary research projects on MPAs (EMPAFISH project, funded by the EU and PAMPA project, funded by the French Environment Ministry). Its aim was to characterize the behaviour of recreational users, their attitude towards the marine park, and to provide information for an assessment of its economic value. More than 2,500 answers of recreational users were collected. On the basis of these results, the second part of the paper proposes a simple illustrative model of demand for recreational uses of the MPA, taking into account both environmental and congestion effects.

Transversal issues/TI06
Marine protected areas

The economic value of exclusive use rights in subsistence fisheries: case study of the Marine Protected Area (MPA) of the National Park of Banc d'Arguin (PNBA) in Mauritania

ID paper: 330

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The PNBA is one of the largest MPAs in Africa. Only subsistence fishing by resident populations is authorized either on foot or using non-motorized dories, limited in number to 100. A development policy was adopted in 1998 to benefit the resident population by: (i) re-deploying fishing effort targeting a non-sustainable shark fishery and (ii) creating alternative incomes through sustainable and selective sea bream and croaker fisheries. Policy incentives include subsidies to renovate dories and develop cold storage, training, credit and purchasing shark nets. PNBA monitoring since 1999 shows that fishing activities have considerably increased and that shark by-catch remains high. The wealth (rent) generated by the activities tends to be capitalized in the value of the fishing rights, mainly the vessel, the average value of which greatly exceeds the subsidies given by donors for its construction. The economic rationalization of the fishery now poses new challenges for the Mauritanian authorities: changes in vessel ownership and in work and capital remuneration systems, influxes of more productive foreign workers into the Park, and pressure to build new vessels. The PNBA experience highlights both the need to address issues of rent and wealth before implementing policy and the risks involved in developing economic activities based on the exploitation of natural resources in a National Park whose main purpose is their conservation.

Assessing the socio-economic impact of marine protected areas on local fishing communities. Two West-African case studies

ID paper: 199

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From an economic point of view, marine protected areas (MPAs) may be considered as public investments in marine and coastal ecosystem conservation. Several criterions may be used to establish a typology of costs and benefits generated by these investments. One of them is the geographical scale. This criterion is critical for the social acceptability of MPAs: contrasting with the very broad scale of a large class of benefits expected from environment conservation measures (particularly in the case of existence values), most restrictions to human activities imposed by these measures have a local character. This discrepancy is likely to undermine the support of local populations, unless they feel that the restrictions they are asked to suffer for the sake of conservation are balanced by some tangible benefits at their own scale. Economic benefits obviously pertain to this category. In this paper, we address the question of the socio-economic impact of an MPA on local fishing communities, on the basis of two West-African case studies: one is located in Mauritania (Parc national du banc d Arguin, PNBA), the other one in Senegal (Aire marine protégée communautaire de Bamboung, AMPCB). These two MPAs, which are very different from each other in several respects, have been investigated in the framework of an interdisciplinary project dedicated to the impact of MPAs on fishing and ecosystem conservation (Amphore project, funded by the French National Research Agency). In each case, we focus on the question of the trade-off between fishing restrictions that are imposed on local communities for the sake of ecosystem conservation, and the benefits they are likely to derive from the MPA. The Mauritanian case study is entirely focused on the impact of the MPA on fishing: drastic limitations apply to the activity of fishing communities living within the park, but they are balanced by the monopoly which is granted to these communities on the fishing activity within a considerable part of the Mauritanian coastal sea. We analyse the impact of these two regulations on fishers incomes with the help of a database of small-scale fishing that makes it possible to compare fishers incomes inside and outside the park. The Senegalese case study encompasses both fishing and non-fishing effects of the MPA on local populations. The Bamboung MPA is characterized by a fishing ban, supported by financial compensations intended to foster the development of ecotourism in the area. We analyse the trade-off between these two sides of the MPA on the basis of a field-survey of local populations.

Transversal issues/TI07
Marine protected areas

Coastal marine protected areas in Japan and their institutional characteristics

ID paper: 318

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A survey was conducted to create a comprehensive list of marine protected areas (MPAs) in Japan. There exist more than 1,000 fishery cooperatives in Japan, and many of them have established no-take zones for many years. Such zones are usually not reported to the government and, therefore, the complete picture of the MPAs in Japan has been largely unknown until now. Information on such local MPAs was collected through various sources, and a list of more than 1,000 MPAs was produced. Many of them take the style of self-imposed voluntary regulations. Nonetheless, it was suggested that free-riders of the conservation activities were uncommon. Surveillance activities are carried out by the fisher s group themselves in addition to those conducted by the governments. This is because agreements are usually made to maximize the benefit of the group of fishers and each member of the group monitors the compliance status of other members. The government has provided territorial use right for fishers, and this could have helped maintain such a self-governance framework. Ostrom (1990) pointed out that regional and national government can play a positive role in providing facilities to enhance the ability of local appropriators (resource users) to engage in effective institutional design . The case on voluntary MPAs in Japan can be regarded as a perfect example of such collective action by the local stakeholders.

Artisanal fisheries in Palamós - economic indicators - Marine Protected Areas.

ID paper: 132

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Artisanal fishermen are the great unknown of fisheries. Being the more numerous segment, is the more abandoned community by managers. In a generalized context of overcapacity and taking into account the dwindling state of resources, the situation seems to be paradoxical since artisanal métiers are considered to be the less impact on ecosystems, considering the rules in force on fisheries and, on the other hand, it is the segment with less representative status and, consequently, the less influential in decision makers. Only in the frame of habitats protection is well represented. Artisanal fishermen in Palamós presented in 2007 a proposal of creation a Marine Protected Area of fisheries interest, which scope was pulling through the current situation and preserve its future. Traditional fisheries management has been mainly under a biological point of view, in a poor data context. Notwithstanding, it seems to be logical that first studies in this case have socioeconomic content. Data available coming from sale notes and a rather field survey have been used to establish the socioeconomic reference situation of artisanal fishermen in Palamós, by indicators theory and trend analysis techniques. It deals with a preliminary approach in the discussion of the proposal, which will help on the monitoring of scopes of the marine reserve.

Transversal issues/TI07
Marine protected areas

The role of MPAs in the development of Northwest Mexico fisheries

ID paper: 260

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The northwest coast of Mexico is accountable for almost 70 % of the country´s fishery production. This region, which includes the Gulf of California and the Pacific coast of the Baja California Peninsula, is also extremely important in terms of biodiversity and the presence of endemic species. Consequently, eleven marine protected areas (MPAs) have been established along the region. Although conceived primarily for biodiversity conservation, natural protected areas are having increasingly important socioeconomic effects. To better understand the effects on coastal communities, we conducted an analysis of the role that MPAs are having in the development of the region´s fisheries. Six MPAs were selected for analysis using case study methodology. The main issue under investigation is the effect on fishery productivity. Main sources of information were documental research, official fishery statistics and expert consultation. Preliminary results suggest that the impact of MPAs on fishery productivity has been mixed. Better results have been achieved by the MPAs of the Pacific coast of Baja California; and that community involvement in MPA design and management has been instrumental in explaining these improvements.

JIFRS-Yamamoto prize session: responsible fisheries in practice

Yamamoto Prize (Short title)

Estimating the economic benefits of cooperative and non-cooperative management of illex argentinus fishery in the Patagonian marine ecosystem

ID paper: 96

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The Patagonian marine ecosystem supports one of the most productive straddling fisheries of the world, with important commercial shared fish stocks such as the Argentine shortfin squid (Illex argentinus). This resource is exploited by different foreign fleets that operate both within the Argentine exclusive economic zone and within the adjacent area beyond the 200-limit, as well as in Falklands (Malvinas) waters. Hence, the countries face what is known as stock externality in which one nations catch impacts negatively on the other country. However, little research has been done on the economic aspects of this fishery. In so doing, is this paper we use the predictive power of the game theory to explore the economic benefits of cooperative or non-cooperative fisheries management of Illex argentinus between Argentina and the United Kingdom. The model used here is a discrete-time of finite horizon with the fishery steady state static model of fishing. The preliminary empirical results suggest that there is a correspondence between what the fishery has experimented over the last few years with a situation of non-cooperative scenario. However, the paper demonstrates that in the cooperative scenario both players would obtain better economic benefits, because both would reduce the fishing effort and the abundance of the stock would remains below the reference points recommended by scientists.

Yamamoto Prize/ ID 18
Yamamoto Prize

A system of indicators to understand the socioeconomic and ecological interactions and manage the fisheries sustainability

ID paper: 125

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In most of the coastal countries, the fisheries enable to satisfy multiple socio-economic needs such as food safety, public receipts, employment, fights against poverty, and so on. It is especially true in many coastal developing countries where fisheries constitute a considerable source of food and incomes. However, the strong pressure on the fisheries resources becomes a great threat for the fisheriessustainability. This context of overexploitation is also marked by a great diversity of stakeholders intervening in the fisheries governance. Thus, a better comprehension of the socio-economic and ecological interactions and the stakes of the fisheries governance is essential to elaborate management policies more adapted to a transition towards sustainability. Based on the case of the Senegalese fisheries,this paper is centered on the selection process of some socioeconomic and ecological indicators whose thorough analysis allows us to propose a strategy of adaptive management of the fisheries resources in a context of multiple objectives, stakeholders and uncertainties. In order to achieve sustainability through an integrated management policy, this strategy is constituted by nine iterative and interactive steps: data collection, processing, analysis, communication, deliberation, decision, action, evaluation and adaptation. Those steps are the main components of the production and the use of any system of indicators.

Organizational strategies in the seafood supply chain of Yucatan, Mexico

ID paper: 72

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This paper aims to generate insights on the organizational forms within seafood supply chain and how they can influence the fishing industry"s flexibility and performance. To accomplish this objective, the vertical organizational structure and strategies developed along the supply chain of the fishing industry of Yucatan are analyzed as a multidimensional concept in terms of its different dimensions of integration.
The study involves interviews conducted during 2008 with the owners of the 20 most important firms in Yucatan's fishing industry. Fisheries managers and social leaders from the fishing activity were also interviewed and direct observations regarding the structure and operation of each company was undertaken.
The study describes the main characteristics and actors, and the nature and relationships influencing the structure and dynamics of the seafood supply chain in this industry. Mechanisms by which the organizational strategies and their degree of integration built a multiple sourcing network to attempt for the maintenance of a reliable supply chain, capable to cope with the stochastic nature of fish resources abundance and new market requirements. Considering that the access to resources and markets is a highly competitive process and a major challenge the fishing industry is currently facing. Thus, it is argued that efficient seafood chain management can contribute to the improvement of fishing industry performance and fisheries management if seafood chain organizational strategy incorporates measures not only for fishing under the scheme of mass production but for the maintenance of resources

Yamamoto Prize/ ID 18
Yamamoto Prize

Senegal's challenge towards fisheries co-management

ID paper: 446

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This video was produced by the Japan International Cooperation Agency to show the fisheries co-management activities recently adopted in Senegal. The structure of the video is as follows: causes of decline of fisheries resources, change of strategy from top-down to bottom-up fisheries management, building consensus among the fishermen with the support of local administration, implementation of biological rest of octopus, underwater view of spawning devices for octopus, income generating activities, examination of the factors which allow the continuation of fisheries management. This Senegalese experience could possibly be referred to as a solution in other countries where the conventional management system proved to be inefficient.

Poster Presentations

(Joffre Area)

Regular session

Aquaculture economics

Economics of inland fish production in karnataka state, india - implications for development

Presentation number: 1
ID paper: 31

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India is the second largest producer of freshwater fish in the world. Fisheries sector has an important place in Indian economy, besides being a rich source of protein; it provides income and employment to millions of fishermen and farmers. Karnataka state is one of the richest among the Indian states having inland water spread area of about 0.52 million hectares with rich resource potential for inland fishery contributing over 6% to country s fish production. An empirical study was taken up in Karnataka state covering randomly drawn 120 fish farmers from three districts having highest inland fishery resources. The study revealed that, the average area of fish pond was 1.04 acres with 6.41 feet water depth. The variable cost constituted 80 % of total cost with fish seed, feeds and labour taking the major share. The technological coefficients revealed that the stocking rate and fish feed, labour and fertilizer resources need to be reduced and rationalized to the optimum level. The investment feasibility analysis showed a benefit cost ratio of Rs. 1.30, net present value of Rs. 1,27,156 per acre and 39.21 % internal rate of return. Majority of farmers sold their catch directly to consumers realising 95 % of consumer price. The farmers who sold to retailers-wholesalers realized 57 % of consumer price. Inadequate quality fingerlings, loan facility and risk in marketing were the major constraints reported. The outcome of the study demonstrates the need for improvement in the management of aquaculture farms through appropriate policy and institutional support.

Causality between price, operated area and employment in aquaculture production

Presentation number: 2
ID paper: 53

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The role of aquaculture industry is becoming more prominent in order to supplement marine capture in meeting the food need of the growing population. In an attempt to minimize depletion of marine fisheries only traditional vessels are allowed to fish along the coastal area while bigger vessels are regulated to deep-sea fishing. According to the Malaysian Economic Planning Unit of the Prime Minister Department (2006) during the 9th Malaysian Plan this subsector has been recognized as the engine of growth of the national development strategies in agricultural food sector. Future fisheries policy is expected to continue emphasizing on aquaculture production and technological improvement as an alternative to marine capture. This paper investigates the causalities between the selected freshwater fish prices, aquaculture area and production. The study aspires to establish whether or not market price is a key contributor to a rise in the aquaculture area and production. It is hypothesized that aquaculture firms, comprise the individual operators are motivated to profitability which is reflected in higher prices over cost of production. Production increases give rise to greater participation of culturists which is reflected in increased potential for employment. However, production increases may have possible negative impact on the environment. The former relates to employment opportunity generated from aquaculture undertakings and the later to the sustainable development of this growing industry. A multivariate co-integration analysis for the annual data dated 1977 to 2007 will be used in this investigation.

Budgeting analysis of catfish marketing in ondo state, nigeria

Presentation number: 3
ID paper: 364

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This paper addressed the budgeting analysis of catfish marketing in Ondo State. The catfish sellers were interviewed from the market with the aid of structured questionnaire and personal interviews. Data were collected using simple random sampling technique from fifty (50) marketers. The data collected were analyzed using frequencies, percentages, profitability analysis, Gini coefficient and regression analysis. The socio economic characteristics of the respondents analyzed revealed that 98% of the marketers were female while 2% of them are male. Also, the study showed that 82% of the sellers are married and 2% are single, 16% are divorced. It also showed that modal experience of the sellers is between 2 and 5 years as attested to by 60% of them. The profitability analysis showed that catfish marketing is profitable with an income of N 2,998 per marketer per marketing operation. The Gini Coefficient value of 0.74 showed a high level of inequality in income distribution among the catfish marketers in the study areas and also a high concentration of catfish marketers in the study area. The regression analysis showed that total kilogram of catfish sold, price per kilogram of catfish, experience in years, transportation cost of catfish and age in years are determinants of income of catfish marketers and accounted for 91% variation in income of the catfish marketers. The problems militating against catfish marketing in the study area include; high rate of spoilage and high cost of transportation in the study area. The study recommended among others that: . All the three tiers of government in Nigeria (Federal, State and Local) should try as much as possible to organize seminars, workshops and necessary trainings for catfish sellers on how they can reduce their losses so as to have a required and sustainable income.

Optimal rotation time for the polyculture of tilapia nilótica and white shrimp in freshwater.

Presentation number: 4
ID paper: 415

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It was obtained the optimal rotation time for the polyculture of tilapia nilótica and white shrimp in freshwater, with a bioeconómic model. Data for modelling were extracted from an experiment conducted in CINVESTAV-IPN, unit Mérida, during the summer of 2008. The stocking densities studied were 32.2 tilapia/m3 and 33.7 and 50 shrimp/m2. For simulation were considered the technical and economic characteristics of tilapia culture in Yucatán Mexico. Randomness was included in the two most influential variables of the system, in order to obtain more attached to reality results. The optimal rotation time strategy was longer than the commonly used by the tilapia farmers.

Economic analysis of polyculture Tilapia and Australian redclaw crayfish

Presentation number: 5
ID paper: 420

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The present paper studied system viability of tilapia nilotica and Australian redclaw crayfish in polyculture, considering tialpia as main species. Three scenarios were analyzed: tilapia monoculture with 38.7 fish/m3 and tilapia and Australian redclaw polyculture, considering the same stocking density for fish in monoculture and 17.5 crustaceans/m2, of which one included a physical separation between species. Modelling and simulation was conducted with the PowerSim software. The results showed the polyculture without physical separation, generated the higher income (4,070 dls) and benefits (619 dls), a harvesting time and size of 197 days and 350.7 g for tilapia. Modelling data proved useful tools for decision-making allowing establish optimal harvest time for the monoculture and polyculture of the studied species.

Economic and institutional constraints to development of marine fish cage culture in Vietnam

Presentation number: 6
ID paper: 458

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Abstract Vietnam with three-quarters of the country is mountainous and hilly, around 1.4 million ha of inland and coastal waters suitable for aquaculture purposes. In Vietnam, marine fish cage culture has been developed since the 1970s and significant expansion took place in the early 1990s. There are approximately 500 ha of coastal pond culture of marine fish in Vietnam producing more than 1,000 t of products, mainly groupers with a farm gate value of more than VND100 billion (more than US$7 million) in 2003. This paper reviews the current status of marine fish cage culture and identifies the constraints as economic, institution and policy to develop the marine fish cage culture in Viet Nam. Hien Tran Thi Vice Dean of Economics Faculty Viet Nam Fisheries College Email: nhatthihien2005@yahoo.com

Assessing micronutrient deficiency as part of meeting millennium development goals for fish growing households in vietnam and the papua new guinea

Presentation number: 7
ID paper: 247

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Studies on poverty have focused predominantly on low income and food poverty. Little or no attention has been given to the emerging problem of adequate calorie intake accompanied by low micronutrient levels, particularly in diets of rural households in transition and developing economies. Micronutrient deficiencies are related to child mortality, maternal health and the general combating of disease. The health benefits of consuming fish are well documented, but the nutrition status of fish growing households still remains questionable. In this paper a simple calculation of the micronutrient levels from foods consumed in Vietnam and Papua New Guinea is presented. Data from Living Standards Measurement Surveys (LSMS) are used. The computations from these data can be used to inform food security policy, health policy on calorie switching, and also provide an assessment of the contribution of aquaculture to rural livelihoods. The results suggest that nutrition profiles of rural households must include foods grown at home, food given as gifts and the traditional foods purchased by the household. A simulation experiment on the likely profile of calorie intake as a result of switching to traditional foods is also presented. The results of the study have implications to practitioners working on achieving the MDGs, or similar. Rural households can definitely benefit significantly from greater access to their land and sea resources and traditional food choices. Nongovernment organisation can also use the micronutrient audit as an indicator of effectiveness of their strategies to target MDG goal number 1.

Economic evaluation, growth performance and nutrient utilization of rumen content in the nutrition of african catfish (clarias gariepinus) burchell, 1822.

Presentation number: 8
ID paper: 471

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A total of 225 Clarias gariepinus fingerlings with average weight of 8.30 g±0.01 were fed rations in which rumen content (RC) were included in a completely randomized design. They were grouped into 5 treatments of 3 replicates, each containing 15 fish, fed RC in a practical diet at 0, 6, 12, 18 and 24% dietary inclusion levels for 72 days. The total feed fed (TFF), average daily weight gain (ADWG) and protein productive value (PPV) were significantly affected (P0.05) by the treatments. Fish fed 6% RC had the best mean weight gain (9.21g), SGR (0.42%/day) and feed efficiency (TFF) (0.49g), FCR (0.05) and PER(0.37g). A part from diet 2, MWG. SGR and PER were inversely related to the level of RC in the diet. The study showed that RC gave the best growth performance at 6% inclusion in Clarias gariepinus fingerlings diet. The control diet had the highest feed cost per kg of #9.44 and the lowest was recorded for fish fed 24%RC. Fish fed 24% RC (diet 5) had the best feed cost per kg (#4.88), least cost of weight gain per fish (N1.96) and cost of feed consumed per fish(N0.038).

Status of aquaculture environment and sustainable development solutions on nha phu lagoon, khanh hoa province

Presentation number: 9
ID paper: 8

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The result of investigation about impact of aquaculture to water environment quality on Nha Phu lagoon (Khanh Hoa province) acknowledged: water environment quality was serious decline because of chemical s no using true, organic waste from shrimp pond, waste water, mud from shrimp pond and agriculture actions, accumulation sediment from mytilus smaragdinus raising actions, and hundred of mangrove forest had been destroyed for aquaculture actions. Life of fisherman on Nha Phu lagoon was too difficult. A number of solutions contribute to improving of water environment quality, such as planning, training and awareness advance, career structure change, funding support and market extending.

Influence of climate change and natural disasters for fishing communities and propose appropriate policies

Presentation number: 10
ID paper: 484

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Data were collected and investigated on 33 communes, 86 villages with a total area of 22,000 ha lagoon. The research are applied with quantitative and qualitative applications. The results were conducted in stable livelihood in the long-term, ensuring life. The results were showed the thousand of residents, the socio-economic situation, education level, working age, income. The age and education level influenced on the exploitation and aquatuc resources. General characteristics of the sampan inhabitants to live on the water facilities for fishing activities, living simply eating, bathing, washing is done on water and water carried in all, they also are not interested in the problems. They accepted with an unstable and moving and regional and fishing gears. The climate change influenced on aquaculture activities and sampan communities, more than 60% changed in fishing capture for livelihood. There were 59.2% and too many fluctuations in climate weather. In addition, up to 81.6% of respondents said that the typhoon in the last 5 years is worse evolutions. There were 42.9% of people were problems by water level changes 75% live are being gradually exhausted. The results have shown clearly that the chemical in fresh or salt chemical lagoons ongoing serious. There were 85.7% for those situation salty/sweet goods affect lives and their livelihoods. Understanding and forecasting on climate change for a good solution to responsible to climate and resources change, 81.9% of respondents. In particularly, a highest of 89.1% in 2 districts. The respondents in all three districts.

Regular session

Economics of fishing activities

Regulation and political risk in shared fisheries

Presentation number: 11
ID paper: 366

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This paper seeks to study government s regulation of fisheries (or other natural resources) in the presence of the following two characteristics: 1)The fishery is shared between different countries, so that there is at least one other country also regulating the fishery. 2)There is some level of political risk regarding future decisions in both/all countries, which is recognized both by fishermen and governments. The main question we study is how this political risk should affect the government s policy. We focus on two aspects of government policy; enforcement levels and political uncertainty in own country, and use these to analyze potential effects on investment levels and rent seeking behaviour.

Livelihood strategies of african floodplain fishers under hydro-climatic changes

Presentation number: 12
ID paper: 394

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Although diversification of producing activities and migration abilities are often supposed to reduce vulnerabilities of the rural households, it should not be considered as a general rule. In the Central Delta of the Niger River in Mali, fishers are massively involved in rice farming as secondary activity and many of them are equipped with motorized canoes to carry out seasonal migrations. Nevertheless, they have difficulties to use such capacities to cope with the interannual variations of hydrology. Because the Delta area has long been occupied and has reached saturation and because of the strong seasonality affecting the floodplain ecosystem, the fishers undergo heavy constraints when handling their activities. Thus, the diversity of the observed traditional livelihoods strategies among floodplain fishers communities is the result of fine tunings in exploitation strategies and in social sharing of the natural resources, but it by no means constitutes a range of flexible options. Hence, fishers households have actually few real degrees of freedom to manage their trajectories to face the environmental stresses, namely the weakening of the seasonal flood. Therefore, distant migration to other aquatic ecosystems (such as estuaries and reservoirs) is the most frequent answer adopted by the floodplain fishers under hydro-climatic changes, in spite of the associated risks. This exile maybe accentuated in the next years with the creation of new dams and the extension of irrigation in the upstream parts of the Basin of Niger which will reduce their present natural resources.

Fisher informal behaviour

Presentation number: 13
ID paper: 274

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When we observe activities in french Guyana, we look some particular behaviours without references on modern or traditional economic sectors. It's informal behaviours creating disequilibrium. Fishering sector is a good example. We propose an examination as from two perspectives: in one side a productive logic, in the other side a trade logic. It's possible to reveal a conflict between the actors for appropriation of richness. We esperate to conclude on the finding and various methodologies.

Economics of Fishing Activities/ FA10
Small scale fisheries

Artisanal Fisheries in Senegal. Landing sites as engines for local development

Presentation number: 13
ID paper: 274

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The artisanal fishing sector is very active in Senegal, providing 75% of total catch and major contributions to food supply, employment and exports. Artisanal fishing is spread along the coastline and involves different groups of migrants or sedentary fishermen using various fishing gears and techniques. Resources are heavily exploited and the priority is on maximising net income from the catch by reducing operating costs and post harvest losses, and improving market efficiency.
Mainly with external donor funding, the government of Senegal invested in landing sites providing facilities for fish landing, processing and marketing, as well as suitable infrastructure for inputs supply and support activities. The landing sites are conceded by the State to the local municipalities which retain responsibilities on roads, security and waste management, while day to day operation is conceded to fishermen organizations. The expected outcomes of the projects were multifold, including: safety at sea; improvement of sanitary quality; increased fishermen income; capacity building; new business opportunities; improvement of working conditions, security and health; and overall local development.
Actual projects outcomes were very site specific, and some unexpected effects occurred, including willingness to pay utilities, fishermen capacity to manage landings for maintaining sales prices and even addressing statistics and resource management issues and traditional processing activities. The relationship between municipalities and fishermen, reflecting the integration of the fishing industry in community's life, and the credibility of the management team strongly influenced sites profile.
The poster reviews sites strengths and weakness, outcomes and impacts in their different contexts. Lessons and recommendations are drawn for improving sites management and maximising social benefits.

Critical success factors for the adoption of traceability systems in chinese seafood enterprises

Presentation number: 15
ID paper: 50

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The growing global interest in traceability in supply chains has resulted in a variety of public policy and private sector initiatives in numerous countries. It is widely accepted in developed countries that whole chain traceability of food - from inputs, treatments, processing and packaging distribution and marketing - is absolutely essential to ensure safety, to ensure export market entry and to enhance business competitiveness in global markets. A number of food safety scares however have increased both national and world-wide concerns over the quality of Chinese food products and the effectiveness of traceability implementation and monitoring in the Chinese food sector. Although traceability systems for some fresh products have been introduced, there have been no published studies which have identified the critical success factors governing the adoption of traceability systems in the Chinese seafood sector. The study aims at revealing the critical success factors for the adoption and implementation of traceability systems through a series of focus group discussions with participants from government, fishery enterprise managers and technical staff . The findings of this study can inform and help fishery enterprises and market regulators to consider such factors before embarking on the journey of traceability adoption.

The economic performance of fishpond culture in parigi moutong regency, central sulawesi-indonesia: the way forwards for food security strategy

Presentation number: 16
ID paper: 57

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Tomini gulf in Parigi Moutong, Central Sulawesi covers of 10,306 hectare area, in which about 35% is utilized for fish pond culture. The average productivity is below the national level (1.23 ton/ha/year out of 2.50 ton/ha/year). While the fish consumption per year is also lower (18.97 kg/cap) than the national level of 21.82 kg/cap. In 2007, the culture fisheries of Indonesia was supplied by Java dominantly for about 53.78% and Sulawesi contributed for 27.60% (about one-fifth portion was shared by Central Sulawesi province). This situation shows that fish culture which is dominantly in form of fishpond for shrimp and milkfish. But they are remain less in their economic performance. At the sametimes, the people s consumption behavior is also reluctant to achieve the sufficient nutrition of animal protein from fish. This phenomenon may indicate that food security in the study area relatively fragile from both side of producers and consumers. The objectives of the study are: (1) determine the economic performance of fishpond culture; (2) to verify the food security status from the market s driver of producers and consumers; (3) to outline the food security strategy to achieve a betterment in community s welfare in general. Cross-section data were gathered from the survey of 157 respondents (fishpond owner).The frontier production function of fishers in the study area and their cost and returns were estimated accordingly. Marketing analysis of the fish products in the study was also explored. Finally, this study is also outlined the strategy to secure food from fisheries products observed using descriptive qualitative. In overall, the results found that the production function behaves pretty good and has increasing returns although very light. However, it is found that the technical efficiency is not efficient (TE=0.803). But, the cost-and-returns is about three folds. All of this indicate that in the short run, the economic viability of fish culture industry indicates a good prospect. Therefore, the threats and weakness are on fishers capability in allocating the inputs in their production activities. Similarly, it goes to the consumers driver. It is really indeed need to be improved on the awareness of the community (producers and consumers) in order to achieve a better welfare, through managing the food security from fish products in the study area.

Empowerment policies and efforts to fishing community in central java province-indonesia: effective or ineffective?

Presentation number: 17
ID paper: 71

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Several research (Susilowati et al., 2004; 2005; 2007) suggested that in order to achieve certain level of betterment on welfare and life to the fishing community in Indonesia, then need to be launched an action research. Mujahirin et al (2009) conducted the action research in Central Java Province with special reference to North and South of coastal fishing communities. The action efforts in the selected study area have been put on in several type of activities, such as campaign and extension programs to the community (producers and consumers of fish), soft skill improvement ability, training on fish hygiene, processing and packaging as well as improvement in marketing skill; and helping to set up community piloting project. With a help of the Department of Fisheries, Office of Community Empowerment; Department of Agriculture; Department of Industrial and Trade; and the Local Government in the respected regions, thus the action research had have been done. The meta analysis from the previous relevant studies have been done. Mixed method approach (qualitative and quantitative) were also employed. The results found that the parties who have been given for the respective treatments of empowerment (training, campaign, extension, etc) were happy and high enthusiasm. However, at the stage of monitoring and evaluation are taken, it seems to be no significant changed. The key performance indicator s that fishing community attained is relatively sluggish to move forward. In-depth interviewed had been taken by anthropologist and explained that several reasons sounded by respondents, among other are: people were happy to join the action program perhaps due to only to fulfill the invitation from the researchers or DOF who invited them; action program offered are very useful to improve their skill but when to do practicing for further action they are need skills related to the inter-discipline and inter-networking matters to work with other parties. In fact they have lacking on this capacity. Furthermore, officers in the relevant Government Offices perceived that the budget allocation for action program of empowerment (or others else too) is something rather as a project basis only and without rely on the sustainable activities. Therefore, they miss for continuing objective to solve the problem faced by the fishing community. The study is prematurely conclude that the efforts and/ or policies on empowerment to the fishing community in Indonesia and particularly in Central Java Province is indeed need to be reviewed again and of course re-designing the scheme properly to meet the favorable conditions among the stakeholders is highly prioritized.

Can current supply figures support the nutritional recommendation of fish consumption in Iran? A case-study of the challenges in front of a nutrition policy

Presentation number: 18
ID paper: 117

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"Fish consumption twice per week" recommendation has been adopted in many countries, including Iran, by Nutrition experts. Data derived from food balance sheets (FBSs) and national household food consumption surveys (NHFCSs) show that fish consumption has been increased in the last 20 years in Iran. The gap between supply and recommendation figures in order to analyze the feasibility of this policy however needs to be determined. In this study, we took current figures of fish supply and consumption in Iran and calculated the amount of fish needed to support the recommendation of fish consumption. Data obtained from FAOSTAT-FBSs in 1980-82, 1990-92 and 2000-02, and NHFCS reports in 1992-95 and 2001-03. Fish supplies needed to fulfill the nutritional policy were calculated based on 120 and 180 gr/caput/wk scenarios. Sharp increase happened in the average fish supply from 1980s to 1990s, but slowed down afterwards. In early 2000, fish availability and intake were 4.73 and 4.43 kg (as raw-whole fish)/capita/year, respectively. The amount of fish required to fulfill the recommendation were however calculated as 10.97 and 16.43 kg/caput/yr based on the two scenarios, respectively. This study reveals that the gap between present fish consumption and the amounts for nutritional goal is still big. Whether bridging this gap in terms of feasibility, ecological, environmental and logistical burdens is attainable, needs more evaluation. Nutrition educators should be aware of the effects of their campaigns on the nationwide food policy as well as on issues such as consumer demand, prices, and environment.

Assessing natural resource values using the damage schedule approach:fishing and other resource uses of the maya people in quintana roo, mexico

Presentation number: 19
ID paper: 174

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The Maya of Mexico and Central America pursue multiple livelihood approaches, relying primarily on natural resources obtained from the rainforest. Fishing in the many water bodies of the region is one among many livelihood opportunities, but its relative importance has not been assessed previously. Indeed, there remains an overall lack of knowledge among scientists, development agencies and decision-makers of the Maya people s priorities regarding present and future use of local resources. This study sought to add to the knowledge base, through an assessment of the relative values that indigenous people place on the various natural resources used for their livelihoods, within the Mayan Zone in Quintana Roo, Mexico. The damage schedule approach was employed as a non-monetary method to elicit the values that the Maya people place on seven resources, associated with their livelihood activities i.e., soils, woodsticks, trees, fish, zapote, animals and bees. The method focuses on pairwise comparison of potential resource losses. Three groups of people in the community (ejidatarios [land owners], non-ejidatarios and women) were selected to undertake the valuation exercise. The results show that the most valuable resource for all three groups was soils (to undertake slash-and-burn shifting agriculture) and the least valuable was fish . Rank correlation results show that the three community groups were similar in their rankings. Community consultations undertaken to obtain feedback from participants confirmed the study results. Incorporating findings such as these in the decision-making process would likely lead to more locally-sensitive development policies, and livelihood support programs suited to Mayan lifestyle and values

Fisheries as a component of an integrated sustainable development plan in barcelos, amazonas, brazil

Presentation number: 20
ID paper: 205

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Barcelos Municipio (county) is located along the Rio Negro, 400 kilometers upstream of Manaus. The county, which consists of 122.476 sq kilometers (roughly the size of Greece) retains virtually 100% of its original forests in undisturbed condition, and has abundant fishery resources. It is the focus of both sport fishing activity (principally peacock bass) and the live capture industry of aquarium fish (principally cardinal tetra) in the entire Amazon basin. However, a variety of socioeconomic and market structure factors have lead to these industries not contributing substantial income to the county s residents, those opening the door to potential future activities which might prove more destructive. We present a theory of sustainable development based on the creation of additional social and human capital and the preservation of environmental capital that permits the sustainable development of value-added in the region. The plan is based on sustainable use of fishery resources, including sport fishing for peacock bass (Cichla temensis, among other species), ornamental aquarium fish (primarily cardinal tetra (Paracheirodon axelrodi)) and ecotourism. The paper will detail a plan to be implemented over the next several years to increase the value-added from these activities, and to document the impact of the activities on the quality of life of the region s inhabitants, as well as the impact of the activities on the forest and aquatic ecosystems. The resulting plan could be easily modified for other regions that are dependent on renewable resources such as fisheries.

Enhancing smallholder household income through aquaculture: the case of chingale area in southern malawi

Presentation number: 21
ID paper: 242

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Although smallholder pond aquaculture in Malawi has significant potential to offset the current fish supply deficit of 27000 tons/year, its production is low (800 tons/year. The major constraints for aquaculture production are: lack of fast growing species; poor access to formulated feed; poor knowledge on modern fish farming practices, and poor access to attractive urban markets, among others. If these constraints were addressed and a nucleus of productive and profitable fish farms was established, fish production would increase and unlock the entrepreneurial capacity of smallholder farmers. This paper examines the impact of an aquaculture technology package on fish production and income in Chingale, Southern Malawi. The package included: a fast growing strain of Oreochromis shiranus, a program to improve access to quality seed through establishment of community fingerling producers and to link farmers to urban fish traders and consumers. The results show that with community hatcheries and an appropriate distribution model, fingerling mortality and transport costs reduced; access to cheaper quality fingerlings for surrounding communities improved. However in order to produce high quality seed, farmers require initial investment in quality control that also minimizes loss of genetic potential of the brood stock. The use of quality fingerlings and a fast growing fish strain increased fish production and made it more feasible to link farmers to urban fish buyers, where farmers obtained higher prices than they normally get from village markets. The paper concludes that fish production and household income can improve if complementary technologies are implemented as a package.

Economics of Fishing Activities/FA15

Contribution of fisheries to socioeconomic wellbeing

Artisanal fisheries in senegal-landing sites as engines for local development

Presentation number: 22 /ID paper: 249

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The artisanal fishing sector is very active in Senegal, providing 75% of total catch and major contributions to food supply, employment and exports. Artisanal fishing is spread along the coastline and involves different groups of migrants or sedentary fishermen using various fishing gears and techniques. Resources are heavily exploited and the priority is on maximising net income from the catch by reducing operating costs and post harvest losses, and improving market efficiency. With external donor funding, the government of Senegal invested in landing sites providing facilities for fish landing, processing and marketing, as well as suitable infrastructure for inputs supply and support activities. The landing sites are property of the local municipalities which retain responsibilities on roads, security and waste management, while day to day operation is conceded to fishermen organizations. The expected outcomes of the projects were multifold, including: safety at sea; improvement of sanitary quality; increased fishermen income; capacity building; new business opportunities; improvement of working conditions, security and health; and overall local development. Actual projects outcomes were very site specific, and some unexpected effects occurred, including fishermen capacity to manage landings for maintaining sales prices and even addressing statistics and resource management issues. The relationship between municipalities and fishermen, reflecting the integration of the fishing industry in community s life, strongly influenced sites profile. The paper reviews sites performance, outcomes and impacts in their different contexts, using cost-benefit analysis together with multidisciplinary project assessment tools. Lessons and recommendations are drawn for improving sites management and maximising social benefits.

Economics of Fishing Activities/ FA15

Contribution of fisheries to socioeconomic wellbeing

Management strategy evaluation for peruvian anchoveta (engraulis ringens) fishery

Presentation number: 23/ID paper: 360

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Management strategy evaluation (MSE) is a methodology which allows to compare the efficiency of different management strategies in order to ensure the sustainability, in particular those based on viable control theory. Classic strategies (like precautionary approach of the International Council for the Exploration of the Sea, ICES) were compared to strategies defined from a viability control model for the Peruvian anchovy, which provides the biomass levels B which can be sustainable managed (viability kernel) and its related sustainable yields. Five management strategies (E1--E5) were considered to define the total allowable catch Y* for the Peruvian anchovy (Engraulis ringens): E1) social quota (Y* = Ymin), E2) ICES precautionary quota, E3) maximum viable quota Y*=Ymax(B), E4) maximum precautionary viable quota and, E5) half precautionary viable quota. We used five indicators for sustainability, related to the risk of collapse and the mean and variability of yields and biomasses. Two scenarios for initial biomasses were considered (healthy stock and post-collapse recovering stock). The analyses were done with Monte Carlo simulations, with 10 000 simulations per scenario and strategy. Uncertainty was incorporated in the quota implementation, simulating the variability of discards and illegal catches. The effect of the enviroment during 1963--1984 was considered by changing the stock-recruitment parameters during El Niño events. We found that the half precautionary viable quota (E5) could avoid the anchoveta fishery collapse in 1972--1973, allowing yields greater than the social quota. Also, the ICES precautionary strategy (E2) did not ensure the sustainability of the stock during El Niño events. We determine that a one year fishery moratorium after the fishery collapse would have been necessary to return to the viability kernel, allowing a sustainable management thereafter. We conclude that the viability kernel and viable yields are useful tools for designing management strategies which ensure the sustainability of natural resources.

Fishing rights under various acts and legislations with special emphasis on ornamental fish trade in india

Presentation number: 24
ID paper: 439

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Fisheries management is an issue that draws out conflicting responses about the role of the state, the market and civil society over the management of natural resources. As an individual, anybody who is exploiting the common resource will not think of any conservation because the benefits in the short term are much better, creating a conflict of interests between the rational individual and what seems rational for the community. eg. Coastal trawl fishery in India. In this paper the regulatory framework on inland water fishing in India is discussed which includes the collection of indigenous species for ornamental fish trade. The need for limiting the harvesting of fish and thus end open access in fisheries became widely recognized. In India, the National and All State Governments are in the process of amending the Legal Frame Work in tune with the Code of Conduct for Responsible Fishing of the FAO. Some of the State Governments have already achieved this goal. India is set to have Green Certification for each and every species of fresh water ornamental fishes and registration of native species under the Geographical Indications of Goods (Registration and Protection) Act, 1999 for effective international trade and tracking of the source of the products, its characteristics including IUCN status and GI. Indian producers and exporters are also moving towards market orientation for better markets and acceptance of their products. At present India has no legislation on the importation or introduction of aquatic organisms nor is there a proper quarantine procedure in place for imported fishes. However, the country is now on its way to have an efficient regulation and management policy for exotic species introduction and quarantine procedure for both imported and exported ornamental fishes. The paper deals in details on the various property rights issues encountered while implementing various Acts and Regulations. Key words: Property rights in Fisheries, Ornamental fish trade, Green Certification, Geographical Indication

Aquafish Crsp: poverty alleviation in developing countries through sustainable solutions in aquaculture and fisheries

Presentation number: 25
ID paper: 523

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The Aquaculture & Fisheries Collaborative Research Support Program (AquaFish CRSP), headquartered at Oregon State University, brings together resources from US and Host Country institutions to promote sustainable solutions in aquaculture and fisheries. Through integrated, multidisciplinary partnerships, the program aims to increase aquaculture productivity, enhance environmental stewardship, address gender integration, and increase domestic and export market opportunities in participating Host Countries. AquaFish CRSP currently manages eight field research projects in 16 countries in Africa, Asia, and Latin America. Each project focuses on poverty alleviation in targeted countries through the improvement of local and sustainable fish production across four programmatic themes: Improved Health and Nutrition, Food Quality, and Food Safety/ Environmental Management for Sustainable Aquatic Resources Use/Enhanced Trade Opportunities for Global Fishery Markets/Income Generation for Small-Scale Fish Farmers and Fishers
Recognizing the growing global market demand for fish protein, each of the AquaFish CRSP projects are investigating ways to responsibly meet increasing needs for both human consumption and for aquaculture feeds, particularly in developing countries. Research is conducted on a variety of scales in the aquaculture and fishing sectors ranging from proper pond construction techniques and alternative feed strategies to market assessments and value chain development. AquaFish CRSP is guided by the overall goal to improve the lives and income-generating abilities of small-scale farmers and fishers in target countries.

Fisheries management

Fish capture and culture in agro-ecosystems: a new concept for old practice?

Presentation number: 26
ID paper: 194

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Modern fisheries management is strongly based on ecosystem theory. Ecosystem management involves direct manipulation of the habitat and population as well as human activity in order to optimize sustainable returns to humans. The ecosystems approach is widely viewed as a new concept in management of fisheries and aquaculture. Ecosystems based management has however a long history of practice in rain fed and flood prone agro-ecosystems in China and Southeast Asia. Inland fisheries and aquaculture are inseparable components of these systems. We argue that aquatic resource management problems cannot be addressed without due consideration of their socio-economic and agro-ecological context. We conclude that conventional ecosystem based management does not sufficiently capture the complex linkages between inland fisheries and aquaculture, and wider services provided by the ecosystems of which they are part. Inland fisheries and aquaculture management instead should be based on agro-ecosystems management concepts in order to better capture their social and economic objectives within the context of overall ecosystem service provision.

Status of aquatic resources exploitation and sustainable development solutions on nha phu lagoon, khanh hoa province

Presentation number: 27
ID paper: 7

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The result of investigation about aquatic exploitation actions on Nha Phu lagoon (Khanh Hoa province) acknowledged: Exploitation of fisherman was individual (100%) and professional skill was very low. Professional exploitations were major drag net (36.92%), drift net (20 %), tunny net (16.92%). They exploited in Nha Phu lagoon and exploitation objects were fish, crustaceans, squid. The decline of aquatic resources was serious, main causes were overfishing, environmental pollution, mangrove forest destroy. Life of fisherman on Nha Phu lagoon was too difficult. A number of solutions contribute to improving of aquatic resources, such as planning, training and awareness advance, career structure change, no overfishing, boat management, mangrove forest growing and supplementary aquatic resources.

Economic performance of offshore fisheries the case of trawling and purse seining in ben tre province, vietnam

Presentation number: 28
ID paper: 103

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Ben Tre, located on the Tien Delta Triangle with a coastline of 65 km and a privileged fishing area of 20,000 km2, is one of the Mekong Delta s 13 cities and provinces. Therefore, fisheries economy, with fishing activities playing the essential role, has been defined as one of the province s key economic sectors. This study has specified some factors impact on revenues of trawling and light purse seining vessels by using multivariate regression model. Data was collected by directly and intensively interviewing the vessel owners and fishermen working offshore single-boated trawling, pair-boated trawling and lighted purse seining. The study shows that the highest profit investment ratio is achieved by single-boated trawling, followed by pair-boated trawling, and lighted purse seining the lowest. Some factors as length of vessel, engine capacity, crew s professional experience, catching instruments, and age of vessel have considerable effects on revenues of single-boated trawling and lighted purse seining. Based on these findings, this study gives some recommendations to the offshore fisheries in Vietnam.

Managing capacity in an IVQ (individual vessel quota) regime

Presentation number: 29
ID paper: 145

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Prior to the introduction of the modern management regime, the concept of capacity constituted no other reference than the technical capacity of a given fishing vessel. However, after closing the commons and the introduction of a an heavily institutionalized management regime, the fisheries sector have been transfomed to complex web of rules for regulating fisheries in a detailed manner. The core element of this processes referes to the nationalisation of the fish resources, a scientific based quota production (TAC), the introduction of a complex regime for allocating limited fish resources and the quota regime at fleet level. In the Norwegian management system, the "capacity concept" constitute a special status, which corresponds to the individual vessel quota regime (IVQ). In this model, both quota size and the size of the individual vessel are integrated into one system. Hence, the IVQ model becomes a meeting place for technological adaptations as input regulations and the limited quota as output regulations. However, despite the strict and regulated regime as the Norwegian management model, adapting capacity have proven hard to manage. In this presentation I try to highlight the technological interplay between technological change and the institutional responce to modernisational processes.

The history of development of fisheries management and co-management studies in vietnam

Presentation number: 30
ID paper: 183

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Vietnam is the peninsular country and lying in the area of monsoon tropical climate therefore has very diversify and abundant and valuable fish resources. Since long time ago the fisheries resources in natural water bodies (as in dams, rivers, lake, canals, sea) have been concerned as common property (land is owned but fish is common), however the exploitation of fish resources have already closely managed by different level of government and communities of fishers (van chai-village of fishermen) Studying the different fish resources management forms of feudal system and the experiences of regulated regime of fish resources management in France colonial regime from the end of 19 century to 1945 as well as the fixed regime of fish resources management of Vietnamese governments after 1945 and the self-management tradition of fishermen communities helps to find-out and affirm the better form of fish resources management for small scale fisheries base on combination of participation of communities and government and legislations. This study is aimed to summary the process of forming the idea and applying creatively and diversity of co-management community- based in Vietnam adapting the customs and tradition and cultural character of different locations.

Is participation in eu policy-making the answer to improve policy outcomes and legitimacy? the case of the common fisheries policy

Presentation number: 31
ID paper: 189

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The White paper on European Governance suggests enhanced participation and transparency to improve policies, regulations and outcomes. This paper identifies and addresses difficulties and constraints associated with increasing legitimacy through participation using the Common Fisheries Policy (CFP) as an example. The Green paper leading to the reform of the CFP acknowledged that the current framework is not well suited to respond quickly to local and emergency circumstances and stakeholders do not feel sufficiently involved in important aspects of the policy. Regional Advisory Councils (RACs) was created to enhance stakeholder participation and improve policy outcomes as part of the reform of the CFP and hereby gain support for the conservation measures adopted. The paper will investigate how participation (or lack of) and the following representation presently influence outcomes in relation to the CFP in terms of legitimacy and effectiveness. Drawing on existing consultation arrangements designed to provide a full range of views from the fisheries sector and other stakeholders. Concluding that the present move towards increased participation in fisheries policy making will be a Fuite en avant , despite all good intentions and visions as long at the fundamental requirements for realising the vision are not thoroughly understood and the lessons from past experiences of participation are not integrated in the structure and more importantly arguing that increased participation is only a way forward if there is openness and readiness within the political and administrative systems to change the management approach if this become the outcome of a more participatory decision-making process.

Integrating ecological and cultural considerations in marine conservation in a situation of economic crisis. A comparative analysis of two marine reserves in Chiloé Island (Chile)

Presentation number: 32
ID paper: 237

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The Chiloe archipelago (Patagonia, Chile) economy lies upon agriculture, fisheries and aquaculture. The marine activities were recently affected by an epidemic crisis in salmon farming and a market crisis for most of the seafood products, including seaweeds. Two Marine Reserves (Putemun and Pullinque) in this island were also badly impacted by this economic crisis, even more than the rest of the island. Indeed, the conservation aims and rules reduce the flexibility of the territory to cope with the evolution of the economical and social context. This research aims at showing how an integrated management of the territories and their natural resources can better respond to an economic and social crisis in marine activities. To some extent, we show that environmental conservation contributes to the economic recovery of the area by analyzing the evolution of the two marine reserves management: from a single objective of conservation toward an integrated management, and promotion of new local potentialities (cultural, tourism, traditional identity, etc.). After comparing the evolution of the two marine reserves, it appears that they both develop alternatives to cope with new constraints by developing innovative forms of resistance based on traditional activities and cultural identity. They also paved a fruitful way for a participative management, although different initial management schemes, stages of the process, and various stakeholders. Finally, to face the economic crisis and to avoid an isolation of local traditions, they both turn to a promotion of their natural resources as a support of traditional activities.

Fisheries and the coastal marine and Island biodiversity of the Eritrean Red Rea

Presentation number: 33
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Eritrea s Coastal Marine and Island area covers more than 121,000km2, include over 350 offshore islands and 1,350km of coastline (18% of the Red Sea continental coastline) not including the islands. The total coastal mainland population is 73,000, and only ten out of all the islands are inhabited with a total population of about 2,600 in 20 villages. The extensive coral reefs, sea grass meadows and mangroves support globally important biological diversity and maintain the ecological stability and productivity of the Coastal Marine and Island systems. Despite the limited research have been made on the sustainable fish resources and marine biodiversity ,this abundant marine resources has never been exploited for the last quarter of the century due to unstable political situation of the area and low level of technology. The existing estimated potential sustainable fish resources available is (MSY may reach up to 70-80,000ton/year).Which is Pelagic fishes 55,000 ton/year ,Demersal fishes 10,000 ton /year, Coral fishes 8,000 ton /year, Sharks 5,000 ton /year, Shrimps 5,000 ton /year, Lobster & others 2,000 ton/year. Even though this is the potential maximum sustainable yield, yet now the catch is between 6-10tons/year with the maximum recorded was in the year 2000 which is 13,000tons with the primitive and old traditional fishing boats. This low fishing activities and pristine marine environment creates a good opportunity to implement strong fisheries and coastal zone management policy on the coastal Marine and island areas of Eritrea s waters and yet now two marine protected areas are declared.

Incorporating spatial analysis to economic evaluation of the fisheries in Veracruz, Mexico

Presentation number: 34
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Veracruz, México is the most productive fishing state of the Gulf of México. It has a long coastline extending from north to south for about 745 km. This paper incorporates spatial analysis to characterize the fishing production zones and the factors affecting such production along the coast of Veracruz, including physical characteristics of the location, population size and fishing tradition. The results are presented as a GIS of the fisheries in Veracruz. A model is developed for the production in Veracruz. We discuss the implications of the differences and the results of the model and its repercussions for fisheries management.

Impact of population stress on the coastal resources in Kerala, India

Presentation number: 35
ID paper: 438

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The human interference and its impact on coastal zones have been recognized worldwide. Kerala, the Southern State of India with 560-km. coastline, has a population of 3,18,38,619 and the total area available is only 38238 Sq. km. About 2/3rd of the population of the Kerala state is settled in the coastal districts. Consequently coastal villages have a very high population density, ranging between 677 and 2159 persons per Sq. Km. This population pressure and accompanying changing land use patterns have resulted in accelerated destruction of the coastal resources in this region and increased multi-user conflicts. Over exploitation of the inshore fishery resources have drastically affected the stock of various fish and prawn species. Destruction of the Mangrove forest for various anthropological activities has also affected the biodiversity of the region. The paper analyses the various interacting activities, which have a long lasting effect on the coastal environment and its sustainability. Coastal Zone in Kerala is overexploited beyond its carrying capacity. The introduction of the Coastal Regulation Zone Notification in 1991 and its strict enforcement with a Supreme Court verdict in 1994 has helped to reduce the pace of destruction in the restricted zones. It has led to more conscious planning and generated more awareness to protect natural resources. It also led to a drastic change in the property rights regime in the coastal zone, which has caused social unrest and economic slowdown.

Asian moon scallop (amusium pleuronectes) in brebes regency, central java, indonesia: a challenge for marketing and added value improvement

Presentation number: 36
ID paper: 105

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Asian moon scallop (Amusium pleuronectes) or called as simping is widely spread found in the Java Sea. One of the dominant fishing landing is in Brebes. People in Java used to consume simping in form of fresh cooking of the flesh. The shell itself are mostly through away as a waste product. The marketing of simping in local market has not promising to the fishers and traders as the highly value of shell-fish. On the other hand, a favorable market of simping goes to international one with strictly fulfillment of size above 7 cm (diameter). However, fishers catch simping with many variety in size and mostly is under 7 cm in diameter. This might be due to the stock are marginalized as of now. The problem encountered is many of simping production have to be marketed in local due to can not fulfill the export quality. While, in order fishers are able to a favorable simping for export is indeed need stock management. The main objective of the study are: to find out the strategy to improve the added value for local market; and to explore the suitable bionomic stock management of simping in the study area; to figure out how is the waste product of simping (shell and some other part of the flesh) should be processed for handicraft, raw material of tile industry, biogas, fertilizer and also a part component of duck s feed meal, respectively. It should be noted that Brebes regency is considered as the producer of onion and duck s egg in national market. The relevant analytical tool will be employed, such as: benefit-and-cost, cost-and-return; market in conducts; and bionomic analyses. Moreover, it will be explored also mixed-method of quantitative-and-qualitative approach to explore the behavior of producers and consumers of simping accordingly (subject to time frame avails for 2009 research). At the moment the results indicated that the benefit and cost analysis as well as the cost and returns from simping industry are slightly remain feasible in the short term. The marketing of simping are in forms of 3 channels. The first channel is fishers small stockist trader retailer consumers. The second channel is fishers small stockist traders large stockist traders exporters. Lasly, third channel is fishers small stockist traders- large stockist traders whole sellers - retailers consumers. It should be realized that the marketing channels of simping is remain unregulated. Although several efforts have been put on but might not be sufficient yet to in managing the competent parties such as producers, intermediaries, and consumers and the other market components.

A Simple Decision - and How to Get There

Presentation number: 37
ID paper: 118

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Combinations of 7 remarkably similar factors have led to the (partial) failure of recent efforts to address five global or national crises. The paper analyzes the global financial crisis, climate change, the US health care crisis, the blue fin tuna collapse in the Atlantic Ocean and the collapse of fish stocks in Yemen and West Africa from the optics of (i) the strategy of politics, (ii) the role of science and economics, (iii) the effect of (dis-) information and communications, (iv) the role of leadership, (v) weaknesses of institutions and (vi) a variable rest factor, including the nature of opposition. Final decisions balancing the long-term future impact of maintaining the status-quo (or worse) for millions or even billions of stakeholders against the short-term benefits for far fewer stakeholders, favoring the latter, suggest that neither science nor economic considerations largely determined the final outcome, but that a more complex vector of factors was at work. To better manage this vector in fisheries, a Fisheries Authority may be more suitable than existing Ministries and Departments. The author suggests that to improve the chances of success of future local and regional fisheries management: (i) a global pilot program be created with some external donor assistance - establishing Fisheries Authorities in developed and developing countries to demonstrate more effective sector management; and (ii) BA and MA programs be created at two highly rated universities in developed and developing countries to educate future fisheries managers in critical subjects that impact decision making.

Alternative ways of managing sea resources : a guideline for the management of endangered stocks

Presentation number: 38
ID paper: 257

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Marine conservation measures such as moratoriums challenge the economics of fisheries. Efficiency of moratoriums depends on the acceptation by fisheries of such conservation measures. If the measure is unaccepted by fisheries the moratorium is not respected which leads the stock to extinction. The purpose of this article is to identify and analyze the solutions that have to be proposed to fisheries in order to make benefits out of an endangered stock without harming it. The article gives a surrounding of the main alternative ways of managing a stock and identifies the best alternative ways of managing a stock depending on the specie, the situation and the stock remaining. The efficiency of those alternative ways of managing a resource has already been proven therefore this paper has to be seen as a summary and a guideline for the management of endangered species. This study has been carried on to help decision-makers by giving them an overview of the existing solutions and is a good opportunity to broaden the own horizon by showing readers alternative ways of exploiting a resource go beyond the conservative view that the exploitation of a stock consists into fishing only. It has been generalized to all the kind of marine species and gives results of concrete experimentations for each.

The maximum sustainable yield harvesting of a salmon population

Presentation number: 39
ID paper: 151

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The abundance of wild salmon stocks in the North Atlantic (Salma salar) has been declining during the last few decades. Stock development has been especially disappointing in the 1990s, due to a combination of factors, such as the sea temperature, diseases, and human activity, both in the spawning streams and through the strong growth of sea farming (NASCO 2004). Norwegian rivers are the most important spawning rivers for the East Atlantic stock, and about 30% of the remaining stock spawns here. The wild salmon are harvested by commercial and recreational fisheries. The marine harvest is commercial and semi commercial, whereas the harvest in the spawning rivers is recreational. As the wild stock began to decrease during the 1980s, the Norwegian government imposed gear restrictions to limit the marine harvest. Drift net fishing was banned in 1989, and the fishing season of the bend net fishing taking place in the fjords and close to the spawning rivers have been restricted several times. At the same time, the fishing season in the spawning rivers have been subject to various restrictions as well. However, despite all these measures taken to secure and rebuild the stock, the abundance of salmon seems to be only half the level experienced in the 1960s and 1970s. The same sad picture is observed other places. In this paper an age structured wild salmon model is developed, and where the aim is to analyze how harvest of different age classes influence recruitment and stock abundance. Such knowledge may have important management implications. The main focus is to find the maximum sustainable yield harvesting policies under various assumptions. Age structured models are significantly more complex than biomass models. On the one hand, it is relatively straightforward to formulate a reasonable good age-structured model and numerically simulate the effects of variations in fishing mortality between age classes and over time (e.g., Caswell 2001). On the other hand, it is often difficult to understand the various biological as well as economic forces at work in these models. Olli Tahvonen (2008, 2009) has recently published papers dealing with some of these issues and where he finds some results in a dynamic setting, but under quite restrictive assumptions. Early contributions analyzing age structured models, include Reed (1980) who studied the maximum sustainable yield problem. He found that optimal harvesting comprises at most two age classes. Further, if two age classes are harvested, the elder is harvested completely. Getz and Haight (1988) review various stage structured models, and formulate the solution for the maximum sustainable yield problem as well as the maximum yield problem over a finite planning horizon. The following analysis has similarities with Reed (1980) and Getz and Haight (1988). We are, however, studying a different biological system as the salmon is an anadromous species with a complex life cycle. The paper is organized as follows. In the next section, the population model is formulated. The model is somewhat stylized as we consider only two harvestable and hence two spawning year classes. In section three, we find the optimal sustainable yield fishing program. This program is in studied when fertility is approximated by weight in section four, while section five proceeds to analyze what happens when weight is an inaccurate approximation for fertility. In section six we draw some parallels with the maximum sustainable yield policy in the standard lumped parameter, or biomass, model, while section seven proceeds to look at maximum sustainable economic yield fishing. Section eight concludes the paper.

Lessons from the collapse of the stock of anchovy in the bay of biscay

Presentation number: 40
ID paper: 373

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This paper presents an analysis of the collapse of the European anchovy fishery (engraulis) in the Bay of Biscay. The analysis shows that this crisis is a clear expression of general troubles facing the CFP and it s an applied case of deliberations that are analysed in the Green Paper. In the regulation and management of the fishery during the previous years to the official statement of closure of the fishery, we found much of the biases that occur in other fisheries throughout the world, but especially we found many of the inconsistencies of the decision frame peculiar to the EU. In turn the observed behaviour of stakeholders shows some myopic approaches and in this direction we also analyse the weakness of the role of RAC in the renewal of the situation. One might expect a beginning of a new age in the approach to the fishery, notwithstanding, in the recent opening statement, and despite the 5-year ban on fishing, we observe the permanence of many of structural problems that led to the crisis. We propose some measures that would be of interest to reorient and redirect the fishery.

Toward a plan for an integrated management process: an application in the southern groundfish fishery off chilean coast

Presentation number: 41
ID paper: 382

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This paper illustrates a case study to identify problems and actions to build the basis for an integrated fishery management plan, considering stakeholders participation. The application was made on the southern complex multispecies groundfish fishery, where operate various scales of production under a right-based fishing system. A multimethological approach (Mingers, 1977) was used and a key question was formulated to relevant actors. Stakeholders were previously submitted to a personality test to achieve successful interaction during workshops. These were planned following different approaches (Ackerman and Eden, 2001), (Delbecq and Van De Ven, 1986), (Jung, 1976), (Sieler, 2007), (Bandler and Grinder, 1975; 1982). This approach built a communication mode (Trujillo, et.al, 2008) allowing confidence and consensus among stakeholders to bring forth a world (Maturana, 1988) to establish nine relevant critical points out of about 500 problems obtained from individual interviews. These were defined as: institutional weaknesses, policy development gaps, fisheries management operational difficulty, weak supervision system, lack of incentives for small-scale fishery efficiency, small-scale fishermen disunity, rights-based fishing system poor designed, lack of a co-management model and fails to incorporate fishery knowledge into the management process. Critical-problems perceived by stakeholders reveal weak governance in the interface science-policy-fishery decision making. Stakeholders questioned fishery viability in the long run. The feasibility of addressing critical-problems and shaping them as building blocks to support the management plan was explored using social game approach (Matus, 2000).

Sport fishing in Senegal : actors, supply, demand and economic induced effects

Presentation number: 42
ID paper: 384

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Abstract With its 710 km coastline and its tidal lagoon network, Senegal has aquatic resources that play an important role in its economy (2005the fisheries sector is the largest provider of export earnings with 165 billion CFA Francs (ANSD, 2007). Promoted from the 1960s to boost tourism, sport fishing in Senegal, at the intersection of fisheries and tourism, has had great moments with his titles of world champion in 2002 and 2003. This worldwide breakthrough has not lead, so far, to the expected expansion of this activity which remains little known to many Senegalese and whose economic effects remain poorly informed. Who are the actors? What is the structure of supply and demand? What are the value added and the employment generated by sport fishing? To help answer these questions, surveys were conducted in Senegal (Dakar, Petite Cote Sine-Saloum) on tourist hotels, fishing clubs and centers, skippers of structures and freelance skippers as well as recreational fishermen tourist; in France, travel agencies have been targeted. It is shown that sport fishing is practiced mainly by non-resident tourists and residents. The supply of sport fishing is done through specialized structures (fishing centers and fishing clubs); hotels whose offer often requires a partnership or simply a contact with providers of sport fishing who can even be artisanal fishermen. The activity is developed on an annual basis, despite of a marked seasonality as for big game fishing which is the most frequent type of fishing and whose main targets are the billfish. A broad satisfaction of anglers is noted, which contrasts with the lackluster perception of actors on the current status of sport fisheries in Senegal. The rate of value added for three categories of actors is hardly above 55%, while it represents 71.73% in senegalese artisanal fisheries. Urgent action targeting better identification of actors, promotion, investments, organization and regulation could help to sustain an important activity for Senegal and potentially not negligible.

Among scientists & fishermen: flagship relationships of a science/society contract

Presentation number: 43
ID paper: 482

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Among scientists & fishermen: flagship relationships of a science/society contract. What we can learn from the French public dialogue Grenelle de la mer and how multi-agent simulations can be useful.As a consequence of the French dialogue process entitled Grenelle de l'environnement , Non-governmental organization access to public scientific expertise and involvement in its development have been promoted. They are presented as a positive evolution of governance that will allow more efficient public actions, and a better management of environmental common goods. Following the Grenelle de la mer and emphasizing this dynamic, Fisheries are put in the situation of probing a new kind of relationships between stakeholders of Fishery and Science.Considering fisheries, join efforts, collaborative structures & organizations have been existing for quite a long time, long before any Grenelle de la mer . Therefore, what new is at stake ? Especially, which methods can we form to question in a useful and pragmatic way the relationship between science and fisheries stakeholders ? Here, we argue that multi-agent simulations can offer original and interesting progress. The presentation will debate the pertinence to use such systems

Mexican abalone and lobster extractions at baja california peninsula considering illegal catch; approach to face the zero illegal catch assumption

Presentation number: 44
ID paper: 123

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The official catch records generally are carried out in the landing operations. There three categories of fishing that are not included in landings; illegal, unreported and unregulated catch (IUU) and are considered like lack of information. It is necessary, to consider these categories of fishing to know the true impact of the fishing upon the fisheries resources and then propose adequate management measures. In this paper illegal fishing of abalone and lobster from western coast of Baja California peninsula, Mexico is analyzed in order to estimate the problem magnitude. From official records of landings and information of illegal fishing reports we do an estimation of total extraction of these resources using Montecarlo´s simulation method.

Evidence of fishing down marine food webs in Galician (NW Spain) small-scale fisheries

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ID paper: 88

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ecosystems are one of the most productive fishing grounds in the world, with important commercial and valuable fish stocks. However, overfishing, IUU activities, discards, habitat destruction and alteration of the biogeochemical conditions of the ecosystem combined with an increase in fish demand continue to drive fisheries to an alarming situation. Hence, the main goal of this paper is to (i) study the ecosystem impact of fisheries via a test of the occurrence of the fishing down effect by examining trends of mean trophic level (TL) of catches and (ii) use the Fishing in Balance (FiB) index to test if Galician marine fisheries are sustainable or not. The temporal trend in the mean trophic level, fisheries-in-balance index and trophic categories catches of the exploited marine community (~160 species) in the Galician small-scale fisheries were examined from 1998 to 2007. The examination of catches, mean >3.25TL and FiB index trajectories suggest that traditional fishery resources are being over-fished. The mean trophic level of fish landed in almost all ecogeographic areas of the coast are declining by ~0.033-0.400, in some of them with higher values than global trends. These results present evidence of the fishing down marine food webs in Galicia with a general MTL decline per decade. Overall, this paper shows that present exploitation patterns are unsustainable, a general phenomenon also detected since the last decades.

Economic effect assessment of pujiang no.1 megalobrama amblycephala breeding and application popularization project--- application of dream system in fisheries scientific research project

Presentation number: 46
ID paper: 111

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The Pujiang No.1 Megalobrama amblycephala Breeding and Application Popularization Project is completed by the research group of Shanghai Ocean University led by chief professor Li Sifa through 15 years of dedicated research with total investment of 4.8 million RMB. This article utilizes the assessment condition of one single product in one single market in the DREAM system to carry out an economic effect assessment on the project during the 23 years from project establishment in 1985 to project review in 2000 and popularization afterwards till 2007. To be specific, this article assesses the change in the well-being of consumers and producers caused by R&D and popularization of Pujiang No.1 . The assessment result indicates Pujiang No.1 Megalobrama amblycephala has created total social return of 12.7 billion RMB in the 8 years from 2000 to 2007 without consideration of discount, which means an annual social return of 1.5 billion RMB on average, including 7 billion RMB for aquiculture producers (annual return of 800 million RMB on average) and 5.6 billion RMB for consumers (annual return of 700 million RMB on average).

Ecosystem management: a management view

Presentation number: 47
ID paper: 160

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The need for management of the marine ecosystem using a broad perspective has been recommended under a variety of names. This paper uses the term Ecosystem Management, which is seen as a convergence between the ecological idea of an organisational hierarchy and the idea of strategic planning with a planning hierarchy - with the ecosystem being the strategic planning level. Management planning requires, in order to establish a quantifiable means and ends chain, that the goals at the ecosystem level can be linked to operational levels; ecosystem properties must therefore be reducible to lower organisational levels. Emergence caused by constraints at both the component and system levels gives rise to phenomena that can create links between the ecosystem and operational levels. To create these links, the ecosystem's functional elements must be grouped according to their functionality, ignoring any genetic relation. The population structure is below the ecosystem in terms of the planning level, and goals for the community's genetic structure cannot be meaningfully defined without setting strategic goals at the ecosystem level for functional groups.

A conjoint experiment to estimate natural resources indirect values associated to fisheries in the manacapuru lake, amazonas, brazil

Presentation number: 48
ID paper: 193

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The Manacapuru lake in the State of Amazonas, Brazil, is well known by it fisheries and unique beauty. In terms of hydrology and biota, this lake receives influences from the Solimões/Amazon river and the Sustainable Development Reserve of Piranha Lake. Because of its natural richness, this region suffers substantial anthropogenic pressures, particularly from fisheries activities. In this area there are two types of fisheries activities: commercial and subsistence. The first one is carried out by local dwellers but also fishermen coming form elsewhere. Subsistence fisheries are developed by riverines living along the bank sides of the rivers/lakes. Eventually these riverines sell their excess supplies in the Manacapuru fish market or to other commercial fishermen. The objective of the study was to estimate indirect values connected to natural resources in the study area aiming to generate an economic reference for public policies regarding economic development and environmental conservation. The study used a conjoint analysis experiment to estimate monetary values associated to environmental resources in the study area.

Patterns of artificial reef use: the case of vilamoura (portugal)

Presentation number: 49
ID paper: 248

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The artificial reef of Vilamoura (ARV) deployed between 1998 and 2001 is situated off the fishing community of Quarteira and the tourism resorts of Vilamoura (Southern Portugal). The reef extends for approximately over 4,000 m long and 1,400 m wide at a depth ranging from 20 to 40 m below the sea level. Biologically it is considered to be already a mature reef, and consequently it attracts several users: fishermen, anglers and divers. Along the year of 2009 there were carried out direct site observations in order to identify vessel patterns of use. This research presents daily, weekly, and seasonal patterns for small-scale fisheries, sea-angling and diving activities over the ARV. In this research there is also investigated how hypothetically environmental and other factors influence ARV use.

Comparing energy intensity results for commercial fisheries in France

Presentation number: 50
ID paper: 355

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The main objectives assigned to ecosystemic indices are to fuel the debate on the best ways to reduce the impact of global warming. Fishing activities are also concerned with the debate. The assessments carried out about fish products show that the use of fuel in the fishing stage has the strongest impact on the environment. This paper addresses the issue of the significance of energy intensity from results obtained for French fishing fleets. The Atlantic French fleet exploits a hundred commercial species or more, but only a few of them are targeted. Energy intensity is estimated on the basis of global production (target and by-catch) using allocation methods. It is then possible to calculate energy needs for individual species. Moreover, fishing gears are separated in two groups, active and passive methods. Methods used in the paper are very close to Life Cycle Assessment methodology but restricting system boundaries to fishing sector. International studies devoted to energy intensity in fisheries concluded that fishing fleets are the main polluters compared to transportation of fish products and marketing sectors (land-based processors and fishmongers). Compared with measures from other international studies, the results prove to be lower when the scale of analysis is large. Quantifying intensity energy on a global scale for fisheries could then be called into question.

A multi-fleet comparison of socio-economic performance indicators of Southeastern Brazilian fisheries

Presentation number: 51
ID paper: 398

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A comparative multi-fleet rationale of socio-economic indicators is described at an ecosystem scale aiming a potential incorporation into fishery management and modelling. Based in a survey of different industrial fishing fleets in São Paulo, Southeastern Brazil, an assessment of fishery economic attributes such as investment, fixed costs, effort, labour, sailing-related costs and profits, as well as a set of performance indicators, allowed for inter-fleet comparison. Costs varied between fleets with fuel being the main cost. Similarities between fleets are driven by the variables: fuel cost, gross income and profits. In general, the best economic performance was associated with indicators of profitability and economic efficiency. Bottom-longliners and both surface and bottom-gillnet fleets showed the best economic performance per fishing trip due to their relatively low percentage of variable cost. Purse-seiners and shrimp-trawlers had the worst performance of both profitability and economic efficiency mainly related to their high variable costs and relatively low catch values. However, in terms of jobs generated, purse-seiners had the greatest value and the sea-bob-shrimp fleet showed the lowest crew size per vessel but generated the second highest total number of direct jobs. The inter-fleet cost and socioeconomic performance analysis reveals that additional attention should be given to the poor profitability of fleets, rent drain, fishing impacts, and open-access related issues, while social indicators might be also considered. Results may calibrate predictions related to management trade-offs between ecological, economic, and social objectives.

Markets and marketing of seafood products

Chinese consumer perceptions, attitudes and willingness to pay for organic fishery products

Presentation number: 52
ID paper: 49

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Increasing consumer awareness of unsustainable aquaculture practices has made the prospects of organic aquaculture both environmentally and economically attractive, but the reasons why an individual purchases organic fishery products and which factors are particularly important and decisive in his/her purchase intention in different market segments are less evident. While the extent of Chinese consumers willingness to pay for safer food is still uncertain and evolving, and given the national government s powerful resolution to enforce greater food safety, it is critical to understand the underlying Chinese consumers attitudes to organic fishery products. This present study aims initially through a series of focus groups at investigating the perceptions of Chinese consumers and their attitudes to organic fishery products in order to determine the key product characteristics affecting the purchase decision. A choice experiment approach with binomial or multinomial logit estimation will subsequently analyse consumer willingness-to-pay for organic seafood. The results will provide both producers and government with insights and recommendations for marketing strategies and policy

Preferences about seafood safety and sustainability among very young children

Presentation number: 53
ID paper: 272

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A group of 75 children from 3 to 5 years old from the earliest stages of a Spanish school was the target of an experimental test focused on the consequences of providing information about safety and fisheries sustainability on their preferences when choosing between different seafood presentations and labels. Both concepts were associated with two different cartoons, a crab for safety and an octopus for sustainability, which were introduced into a set of four different presentations of hake (slice with bone, fillet, fish fingers and hamburger), being the factors of an 8 sets factorial design to perform Discrete Choice analysis. Parents participated with a 16 sets design, including preservation (fresh / frozen) and price as additional factors, to use them as a reference of the criteria followed in purchasing the hake that the children usually eat. Two measures were taken using the same design in a three months term in which the first one reflects children s choice on a set of visual stimuli representing nothing else than a dish of hake. Between the measures, the children participated in several weekly activities in which the concepts of food safety and fisheries sustainability were explained to them by their teachers and seafood professionals in technical visits. At the same time, the two cartoons were linked with the concepts and presented as assurances of safety and sustainability of fishery products like in the case of a brand logo. A test was performed one week before the second experiment, confirming that the kids, with less success in the youngest group, properly identify the cartoons, the ideas related with the crab and octopus, and the consequences and benefits of consuming seafood labelled with them. Results indicate that as better the children understood the association between the cartoons and the concepts of safety and sustainability, as higher their preferences towards the crab and lower towards the octopus. This suggests that children are more concern about their personal safety and the avoidance of diseases than about the environment and its preservation and that the consequences of the first are more evident to them than those of the former. This conclusion is less stable in the youngest group (3 years old) where, in contrast with the other two groups of age, even the concept of seafood safety was diffusely understood.

Marketing of engraulicypris sardella on the southern lake malawi, mangochi district: actors and value

Presentation number: 54
ID paper: 83

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This paper identifies actors involved in fish marketing and distribution of Engraulicypris sardella (locally called Usipa), the low valued fish species. It also examines value of the fish at fishing and trading levels. The key actors in the marketing chain include fishers, processors, drying rack owners, wholesalers, retailers, porters, lodge owners, restaurant owners, district assemblies and transporters. Its high catch and relatively steady supply attract the actors that constitute women. The Usipa fish supply and distribution depend on season, access to beaches and markets and institutional issues. As the fish moves along the chain to the consumer, the value-added is more than three times the beach value as the fishers in the study area receive only 8.4 % of the value added. As a policy intervention, there is a need for organization of the actors into cooperatives to reduce transportation costs, and share risks and introduce post harvest loss technologies.

Aquaculture business planning backwards

Presentation number: 55
ID paper: 1

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The development of the aquaculture sector has been a technology driven exercise, normally associated with research efforts focussing on potential high value species. Once the research is completed to a level where commercial production can commence, there has been a gold rush of companies and investors into the sector trying to capitalise of the perceived profits that can be generated based on existing high market prices for a species. This in turn has led to an over-supply to relatively small markets, price decreases and companies going out of business due to over optimistic business plans. True market analysis has not been undertaken and not included in sufficient detail in business plans, so businesses are not structured or prepared to meet the developing situation. Investors have ended up being burnt by investing in aquaculture and are wary of returning, so finance for aquaculture development has become limited. The fisheries sector is a unique industrial business, as it is the only food producing sector that still relies heavily on wild production, which competes directly with farmed products. This makes marketing all the more important especially when consumers have the perception that aquaculture products are of an inferior quality to wild caught fishery products. With aquaculture now becoming more mature it is becoming possible to predict how the development of a species or project will occur over the investment time frame. This business planning model relies heavily on our understanding of how a fish market functions, and incorporating this in the business plan that potential investors can understand and have confidence in. It is important to stress to investors that: Aquaculture is a high risk, but high return business But businesses must be market led developments, not technology driven developments - though the technology must be able to support development. The product must conform to market expectations and demands and be able to be sold at a profit, being of economic benefit to the producer and investors alike . It is estimated that by 2020, aquaculture will surpass the wild caught sector as the main producer for fish products. If this is to occur, and the producing companies to be profitable, encouraging investment will be essential. Investors will only have confidence, and feel comfortable with aquaculture, if the industry and its participants can demonstrate a much greater knowledge and skill in marketing, rather than their obsession with technology. Technology only provides the production, it is the ability to be able to produce and sell products at a profit that will provide long-term stability for the aquaculture industry. Business planning backwards is therefore a market led form of business planning which takes in to account technology, but uses the technology to provide the products that the markets desire. To do this, we have to understand the market first, and apply this knowledge to the production process.

Fisheries typical production units at northwestern Mexico

Presentation number: 56
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To analyse and project the impact of structural, technological and political changes on food production, the Mexican Government, through the Secretary of Agriculture, Livestock, Rural Development, Fisheries and Food (SAGARPA), is undertaking the analysis of typical production units TPU in the agricultural and livestock sectors, by means of adapting simulation models originally developed for the United States of America. TPU are defined by means of panels in which producers provide technical and economic data (cost of production, profit, etc.) in order to carry out a micro-economic analysis of a base year and its 10-year projection, making assumptions on the development of prices derived from macro-economic analysis. This methodology has not been applied for the case of fisheries up to now, so the project has begun by considering small scale fisheries (for abalone and lobster at the west coast of the Baja California peninsula) and industrial fisheries (the sardine fishery in the Gulf of California). In this study we present the ongoing results on the definition of TPU. For the first one, classification criteria include geographical location, as well as their organization, production and social impact levels; three TPU were defined. For the second, the kind of fishing vessels and the degree to which the freezing, canning and reduction processes are integrated; however, we ended up considering exclusively the type of fishing boats to define two TPU. Each TPU is hereby described and discussed within the framework of each fishery and their historical development.

Marketing margins in war-water and cold-water cultured fish of Mazandaran province

Presentation number: 57
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Fisheries and aquaculture is some natural resources based activities that have an effective role in the economic growth of countries. Aquaculture is one of the productive activities that can have major roles in increasing of production and consumption of fish, where, it can have good employment, foreign exchange earnings, more suitable aqua resources usage, more per head fish consumption with some alimentary and medicinal premium and the prevention from malnutrition effects. To this end, the development and performance patterns of fish products and their supply have had some prominent growth, resulting from some recent years' attempts of the Fisheries Center of Irans. In this standing, the hypothesis is that the high marketing margins is an impediment for any improvement in marketing situation; otherwise, it can increase the marketing comforts of both producers and consumers. The recognition and analysis of this phenomenon will have some effects on the production and consumption rates, where could be some policy and management prerequisite for warm- and cold-water fishes-culture; which, is one of the agricultural activities with almost two decades of experience in Mazandaran province. The importance of effective marketing in aquaculture is enough choice for both producers and consumers from its very early start. In this condition, producers are able to select some new products with more value added and also the consumers' are able to select more sanitary, safe, and diverse products from the markets. This research is a cross-sectional, on-field survey designed to investigate the marketing margins of cultured fish in Mazandaran province. To do this, from 812 warm-water fish-culturing farms and from 177 cold-water fish-culturing farms in two-purposed pools of Mazandaran province, 195 and 67 were interviewed respectively- the sample size were worked out by Cochran formula. The entire information of this research were collected by interviews, observations, and with on field completion of two types of questionnaires cold-water and warm-water fishery farms. The warm-water fish in this study are: carps, silver carps, grass carps, bigheads and the cold-water fish are salmons. The major marketing channel of fish in Mazandaran province is the retailer-wholesaler-aquaculture path which is the main fish sales route in the markets. The total marketing margins for carps, silver carps, grass carps bigheads fish is 10199, 6078, 12371, 4387 Rials per kilo respectively; and 12867 Rials per kilo for salmons. Also in the all types of fish the retailing margins are more than the wholesaling margins. The marketing costs coefficient for carps, silver carps, grass carps and bigheads are 7.74, 5.81, 12.87, 11.75 percent respectively. This shows the low share of marketing costs of 6.64 percent. The average marketing efficiency rates for carps, silver carps, grass carps and bigheads are 31.34, 46.62, 25.2, 62.55 percent respectively, and 26.38 percent for salmons. The estimated marketing margins function for warm-water fish shows the high and direct effect of the retail prices and the values of procured products for sale. The wholesale prices, marketing costs and the quantity of total production of the farms are also directly effective in marketing margins. The production rates of farms have inverse effects on the marketing margins of salmons. This is so due to the nature of price determination in sailors fish markets where it depends on the quantity of supply and demand in selling times. This suggests the planning of some effective policies for controlling the supply and demand of such products. The first step of that are the high level control and the supervision in fish marketing process, from very early stage in the farms till to the last stage of receiving the final products by the consumers. This should be followed until the entire obstacles and problems and their effective solution methods were found out, where the marketing process was entirely and efficiently improved.

Presentation of dogmatis, an inter and multidisciplinary programme for the assessment of the impacts of genetically modified fish, and results about risk of fortuitous import on french market

Presentation number: 58
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DOGMATIS is a research project funded by the French Research Agency (ANR, programme ANR-OGM 2007-2010). The transgenic technologies have been applied to fish since more than 20 years now and some strains are at the premarket or market stage in countries outside Europe. In Europe the main risk is a fortuitous import. Any rumour of uncontrolled arrival of GM fish on the European market may have strong impacts on the market chain, the research and innovation system and the trust in public regulation. The aim of DOGMATIS is to anticipate the answers. It associates specialists of fish transgenesis, GMO detection and regulation, fish market chain economy, consumer sociology and contemporary science philosophy and epistemology. To tackle this multifactorial subject, we developed original methodologies including assumptions based on the quantitative and qualitative knowledge from the different experts of DOGMATIS. We propose to present the programme and the results of our investigation concerning an assessments of the risk of fortuitous presence of GM Fish on the French market, which has been done by crossing the data from scientific literature gathered in a data bank and an expert analysis of filtered statistics of international trade, for the two farmed species concerned by transgenesis techniques and imported on the French market, salmon and tilapia.

A new proposal of sustainable seafood markets index (smi): the case study of the port of vigo (spain)

Presentation number: 59
ID paper: 481

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There is a consensus in the scientific community that overexploitation of most fisheries worldwide has had significant negative effects on coastal marine ecosystems, and the majority of assessed fish stocks still require rebuilding programs. Almost all of the scientific studies conducted in recent decades have focused primarily on analysis related to the biological state of marine ecosystems (e.g., biomass, fishing effort, catches per unit of effort, trophic levels). However, despite the relevance of the economic effects of fish markets on the patterns of exploitation by fishermen, an analysis linking the state of stocks with fish markets has not been attempted. Herein we describe the first effort to construct a seafood market index to measure the sustainability of seafood products. It is essential to understand not only the behavior of the harvested species from marine ecosystems, but also how economic factors (e.g., prizes, concentration of seafood demand, concentration of local markets) can shift the status of exploited species and the strategies used by fishing companies. By combining data on monthly prices, trophic levels, size, and longevity of ~130 fresh seafood species traded in the Port of Vigo (Spain) during 2001-2009 we demonstrate the potential value of the use of our sustainability of seafood markets index (SSMI). Preliminary results presented herein indicate: (i) a decrease in the unit value of the majority of seafood products, which has increased competitiveness among fishing companies, (ii) a decline of trophic levels of catches in the majority of species, and (iii) an increase in the mean longevity of traded species. These results highlight the need to consider economic factors and link them not only to the evolution of market incentives and their effects (e.g., prices, tax incentives, subsidies), but also to the state of marine resources and the availability of food for human consumption.

Yellowfin Tuna: A global and uk supply chain analysis

Presentation number: 60
ID paper: 374

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Introduction Tuna is one of the worlds most traded and sought after species of fish. The global tuna market is worth in the region of $6billion and annual catch volumes of around 4 million tonnes. The tuna supply chain is global and it is broad and complex involving multiple stakeholders. There are a wide range of different factors affecting tuna supply chains and driving stakeholder behaviour in the chain. Objective The paper aims to identify key developments and options for UK based suppliers and processors of tuna. Methods This paper draws on primary based research with UK processors alongside secondary research in order to understand and characterise the different aspects of tuna supply chains. The paper provides an overview of the main tuna supply routes including catching, trading and processing activities and the main consumption patterns. For each of these parts of the chain we identified a range of environmental/market factors. A key factor was international trade rules which have a significant impact upon the tuna trade. This paper also provides an overview of the key consumption areas of Japan, USA and the EU and an analysis of the UK market. Results The findings suggest that there are a number of areas of risk for UK tuna processors and suppliers. Amongst these are international trade agreements, trading conditions and trade data deficiencies. Declining stocks and pressure on these stocks, particularly from the tuna canning industry, is another key risk. The paper recommends that to reduce their exposure to these risks UK processors and suppliers should: review the above developments and identify key risk areas; identify opportunities to influence and so mitigate risk areas; and agree possible stakeholder actions.

Credit crunch: implications for UK seafood processors

Presentation number: 61
ID paper: 379

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The credit crunch has had a dramatic effect within the seafood industry. Recent years saw a buoyant UK economy with increasing sales of chilled seafood material and a growing interest in sustainability. Credit tightening and declining consumer confidence has placed pressures on these trends. This is unlikely to be reversed in the near future and raises questions over how seafood processors balance the requirements of sustainability in a cost conscious environment. As part of the Seafish range of strategic studies, this study set out to consider the implications of the credit crunch for UK seafood processors. A systems approach was adopted with value chain and life-cycle concepts used as the study framework. This allowed the range of competitive pressures within seafood to be described. Drawing on primary and secondary research sources, the study sought to capture how the credit crunch affected customers, processors and suppliers and how the behaviour of these actors reverberates through the industry system. Findings suggest the industry is exposed to a widening set of risk factors, and the credit crunch exacerbates this. Different strategies can be pursued as a response, depending on context. Large processors may be more oriented towards lean and cost control, small and medium sized processors may be more agile but struggle to contain costs. Both have advantages and disadvantages and these may be exposed depending on future global conditions. Future scenarios are identified: a price focussed world (continued recession) and a price plus sustainability world (recovery) to understand relative strengths and weaknesses.

Marketing of dried fish in west bengal an empirical study

Presentation number: 62
ID paper: 59

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Fish drying has been one way of preserving by sun drying. It is has been done for both sweet water and marine fish. But dried marine fish has been the major source of supply. Different type of fish caught from marine sources is not dried. Only some elected varieties of fish are dried. Some times, the excess quantity of fish is also dried. Dried fish has been an important food for the poor people. Also a good part of it is used for manufacturing poultry feed. Generally, in poultry feed prawn and crab is used after drying and grounding it in meal form. There have been various techniques for sun drying of fish, among which the commonest has been on sand and other techniques are on small trays and on bamboo poles. Generally fish dried on sand has been of poor quality because it contains sand. In other techniques as the chance of sand is not there, the quality has also been superior. Marketing channels of dried fish has been many such as from small producers it is accumulated at the level of whole seller. The whole seller may be situated at the sea cost and also at different markets. These whole sellers sell the different varieties fish the retailers and poultry feed manufacturing plants. From the retailers, the fish ultimately reaches the consumers. For this study data on prices of fish has been collected from local markets of West Bengal, India to know the variability in prices received by the producers for different species and season. Marketing margins, transportation cost, handling costs and storage cost at various market functionary levels. Vector-autoregressive test has been used to know whether the markets has been cointegrated

The investigation of the Scophthalmus maximus s market influence factors of China

Presentation number: 63
ID paper: 289

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The Scophthalmus maximus is the main aquaculture species of the flatfish in China, but the stagnant market is one of the bottle-neck problems the industry confronted with. Which are the reasons to influence the Scophthalmus maximus market? How to further expand the market? The paper takes the basis of the investigation of the main production region and the main consumption region, by analyzing the price increment of every node of the industry chain, which including aquaculture production middle logistics and the consumption market, then finding sorting out and analyzing the factors that influencing the market. According to this, analyzing the background causes, and discussing the response tactics, which in order to provide conferences for the decision-making of the related industries. Key words: Scophthalmus maximus, market, influence factors

U.S>. import demand for smoked herring

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ID paper: 431

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U.S. imported 2.3 million metric tons of smoked herring in 2007 costing $707,000. Hence it is important to investigate factors influencing the importation of smoked herring into the US. We used time series data from 1976 to 2007 to estimate an import demand function: log(Mt) = a0 + a1*log(Pt) + a2*log(CPIt) + a3*log(et) + a4*log(Yt) + a5*log(Mt-1) + ut Where Mt is importation in thousand metric tons, Pt is imported price in dollars per ton, CPI represents domestic price, et is the exchange rate, Yt is personal disposable income in US dollars, Mt-1 is a partial adjustment factor, and ut is an error term. The model has a good fit and the R2 is 0.45. Serial correlation is not an issue since the DW is 1.95. All variables have anticipated signs and model results show that a 1.0% increase in import price will result in a 0.8% reduction in quantity imported, whereas a 1.0% increase in domestic price will generate a 1.80% increase in imports meaning that the product is a substitute for domestic smoked herring. The exchange rate coefficient is positive indicating that importation will increase with appreciation of the dollar. The negative income elasticity indicates that imported smoked herring is an inferior good. The partial adjustment coefficient is insignificant implying that there is immediate full adjustment. The results suggest that US consumers consider imported smoked herring a substitute, and with a strong dollar importation will increase, even though imported smoked herring is an inferior good.

Modelling

Changes in a seafood market: substitution and elasticity of fish categories behavior in SE Brazil

Presentation number: 65
ID paper: 400

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Substitution and elasticity give about the history of supply and the demand structure for fish and seafood. It is also relevant to the detection of change in a particular exploited marine ecosystem. The purpose of this paper is to test if market elasticity of substitution of seafood categories can further elucidate on potential shifts in species composition of the Southeastern (SE) Brazil ecosystem. The paper is based on the hypothesis that price is elastic. In order to test such hypothesis, we use a time-series from the São Paulo wholesale market (1968-2007),. A matrix of 100x100 linear correlation of market price and quantities between seafood categories based the analysis. Significance was found between some of the correlations. Results suggest that this particular market seems to follow the global trend of elastic price, revealing important considerations for management perspectives, such as resilience, conservation measures effects, and ecosystem change.

Transversal issues

Northern Alboran Sea anchovy fishery scenarios under global climate change

Presentation number: 66
ID paper: 227

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This paper is aimed at studying the relationship between marine environmental conditions and purse seine anchovy fishery of Alboran Sea through a stock-recruitment model using an historical data set of anchovy fishery in the Northern Alboran Sea that covers two decades from 1985 to 2005 and the HadISST and Era 40 data sets on marine and climate conditions; and modelling the evolution of anchovy fishery fleet short and long run through an adaptive expectation model. Both aims have contributed to build a dynamic system of the fish stock and fleet evolution that have allowed suggesting adaptive fisheries management strategies and to provide anchovy fishery scenarios in Northern Alboran Sea under the framework of IPCC scenarios (A1B and E1) for the next 50 years using regional marine environment scenarios produced in the framework of SESAME integrated project. This paper concludes that the management of the aforementioned fishery would improve sustainability if this dynamic system is used to provide scientific advice when climate and price short and medium run forecasts are available.

How deep is the European Union fleet fishing?

Presentation number: 67
ID paper: 402

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With the decline of main predators whose habitat is confined to continental platforms, the growth in fishing demand and new technologies has caused the expansion of fisheries towards areas which are increasingly deeper. Globally, the quantification and evolution of catches worldwide as well the expansion of deep-sea fisheries have been carried out, but there still remains the need to develop a complete quantitative and qualitative examination of the geographical expansion of the European fleet around the world. Therefore, the specific aims of this paper are to (a) test, through analysis of the mean depth of catches, if there has been an expansion of the European fishing fleet and to (b) measure the vulnerability of exploited fishing resources using the mean longevity as main index of vulnerability during the 1950-2006 period. The results obtained indicate that there is an enormous expansion towards fisheries which are increasingly vulnerable, with slow growth, late maturity and high longevity. Here, the mean depth of catches of bottom marine species of the Union European fleet was 84 m, from 164 m in the 1950s to 248 m in 2003, which duplicates the global values obtained by Morato et al. (2006) for the worldwide fishing fleet.

Transversal issues/TI03
Value of ecosystem service

A microeconomic foundation for recreational effort response functions

Presentation number: 68
ID paper: 406

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Recreational fishermen quickly adjust fishing effort directed at a specific site to variations in fishing quality. Holding all other quality parameters constant, the functional relationship between fish abundance and the resulting recreational fishing effort is denoted an effort response function. This paper proposes a Cobb-Douglas utility function for the benefits of recreational fishing to explain effort response functions with microeconomic theory. Depending on the relative weight of catch within the utility function, a concave, convex or linear effort response function results.

Transversal issues/ TI04
Marine protected areas

Methodological tool for the management of fishing activities within a MPA: the case of the Iroise Marine Natural Park (PNMI)

Presentation number: 69
ID paper: 216

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The management of a MPA requires the monitoring and assessment of economic activities occurring in the designed geographical area. Created by the French 2007 law, the Iroise Marine Natural Park (PNMI), located at the western extremity of Brittany, aims to a sustainable development of the Iroise Sea through the conservation of its patrimonial wealth as well as its cultural and economic identity. Coastal fishing activity, deployed by professional and leisure fishermen, is one major part of this economic identity. In order to ensure the sustainable exploitation of the sea products and support the coastal fishing activities sector, the PNMI wants to improve its acknowledgment of the fishing sector and asks for a methodological tool to monitor and manage it. The study consists in a methodological proposal for this assessment and monitoring based on already existing data and complementary surveys. The Harmonie Database of the Ifremer s Fisheries Information Observatory provides the data based on which the reference population of commercial fishing vessels is designed and characterized according to their dependency to the marine area in terms of fishing effort and catches. The dependency and the features of the vessel s fishing activity are key elements for the fleet stratification and the design of the sampling plan. The surveys consist in direct interviews according to the Ifremer s FIS economic questionnaire which includes new social and perception variables specifically dedicated to the management of the PNMI. Finally, with the help of the PNMI s surveyors, it is decided to run 150 surveys in 2010 corresponding to 45% of the fishing commercial vessels of the reference population.

Economic evaluation of fisheries and tourist services of the veracruz reef system national park, mexico: a spatial approach

Presentation number: 70
ID paper: 216

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The National Park Veracruz Reef System was declared a marine protected area by the Mexican government in 1992. It contains 23 reefs presenting different degrees of environmental deterioration mainly due to the influence from nearby rivers, its proximity to the port city of Veracruz-Boca del Río and the currents patterns. The degree of deterioration depends also upon the type of use (tourism, fisheries, scuba). A conservation assessment of the system is currently under development. In this paper we incorporate spatial analysis to characterize and map the spatial allocation patterns for different activities taking place in the reef system. Our study includes a preliminary assessment of the economic value of the reef based on the tourism and fishing activities. We use information from SCUBA diving shops; tourists guide groups (boat tours), biomass values, and official information for the value of the captures. The travel cost method for scuba and boat tours and published information is used to assess the benefits from the different zones within the park. Multivariable methods are applied to examine the differences of values of the zones taking into consideration: proximity to the coast, conservation status, productivity and structure. The results are discussed and management recommendations for fishing areas are proposed.

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